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Yoshii et al.

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(54) **DEVELOPER CONTAINER, DEVELOPING DEVICE INCLUDING DEVELOPER CONTAINER, AND IMAGE FORMING APPARATUS INCLUDING DEVELOPING DEVICE**

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(73) Assignee: **KYOCERA Document Solutions Inc.**, Osaka (JP)

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G03G 15/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/0832*** (2013.01); ***G03G 15/0865*** (2013.01); ***G03G 15/0879*** (2013.01); *G03G 15/0863* (2013.01); *G03G 2215/0132* (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/0832; G03G 15/0863; G03G 21/1647
USPC 399/12, 262
See application file for complete search history.

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An Office Action; "Notice of Reasons for Rejection," issued by the Japanese Patent Office on Jun. 24, 2014, which corresponds to Japanese Patent Application No. 2012-086943 and is related to U.S. Appl. No. 13/857,828.

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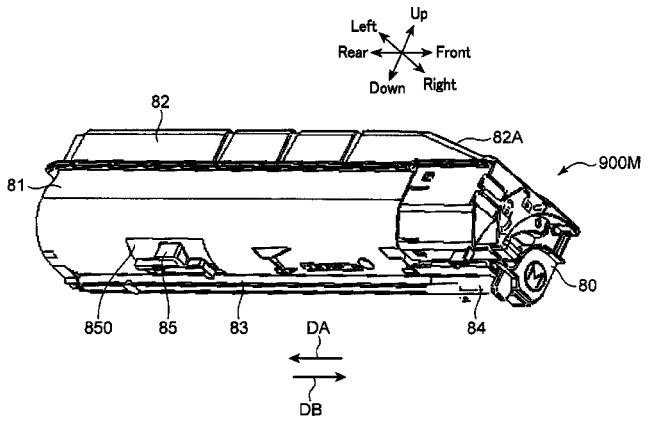
(57) **ABSTRACT**

A developer container is fitted in a first direction to an image forming apparatus for forming an image on a sheet. The developer container includes a main body and a protrusion. An inner space filled with a developer is formed in the man body. The protrusion protrudes outward from an outer wall of the main body. The protrusion includes a plurality of wall surface parts facing in a direction opposite to the first direction. An order in which the plurality of wall surface parts are arranged when viewed in the first direction is different from an order in which the plurality of wall surface parts are arranged when viewed in a second direction intersecting with the first direction. A plurality of wall parts are formed integrally to connect the plurality of wall surface parts through the plurality of wall parts.

15 Claims, 17 Drawing Sheets



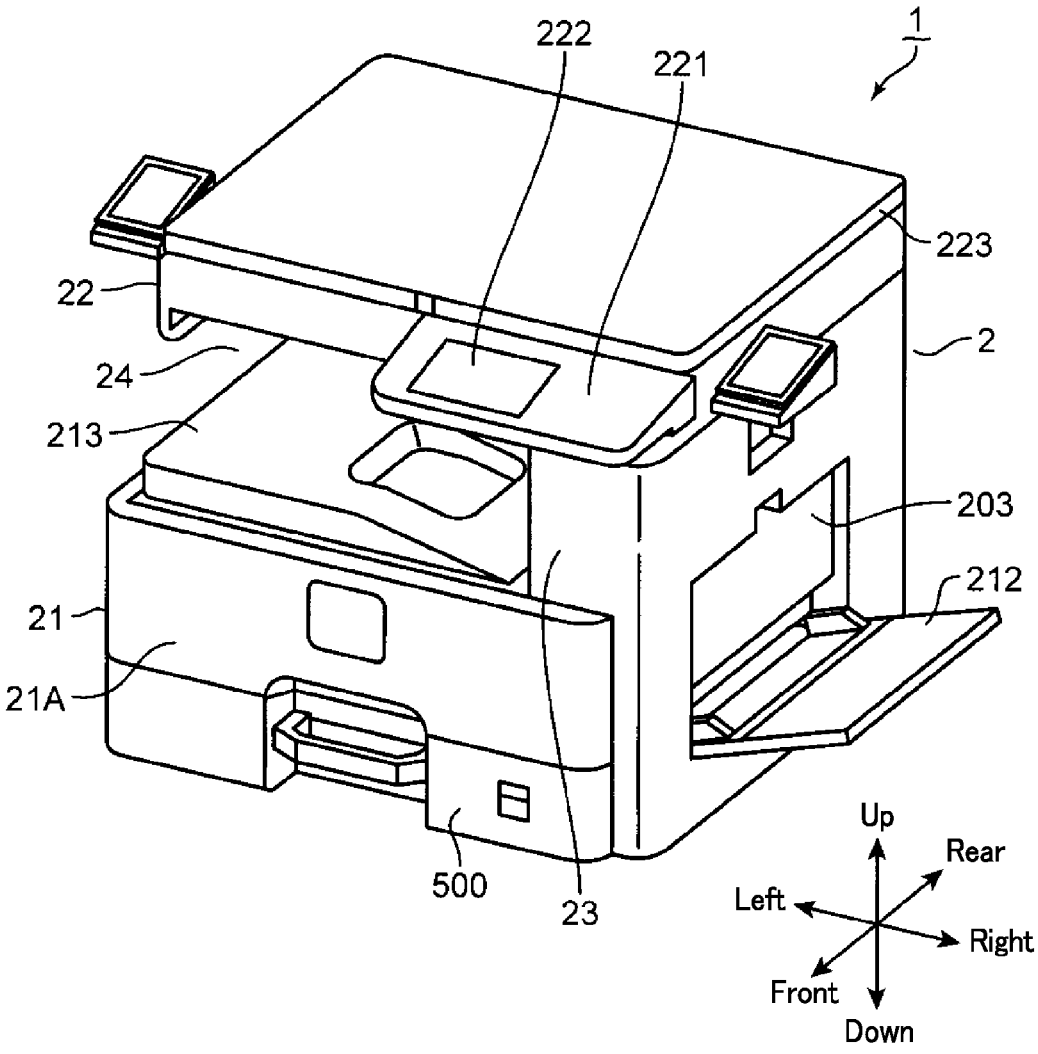

222
221
1
223
22
2
24
213
203
212
21
21A
500
23
Up
Rear
Left
Right
Front
Down

FIG. 1

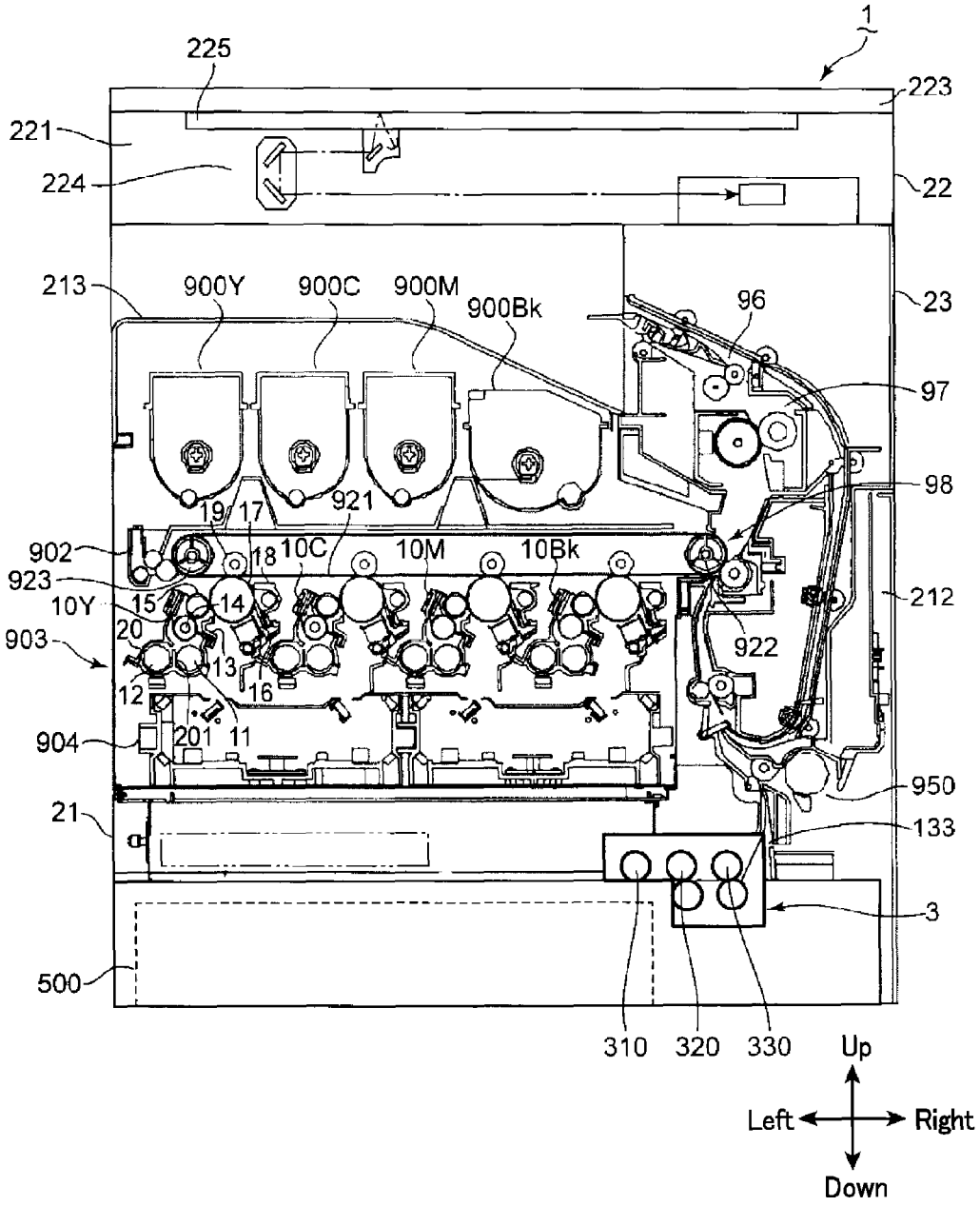

1
225
223
221
224
22
213
900Y
900C
900M
900Bk
96
23
97
98
19
17
921
902
18
10C
10M
10Bk
923
10Y
15
14
212
20
922
903
13
12
16
201
11
904
950
21
133
3
500
310
320
330
Up
Left
Right
Down

FIG. 2

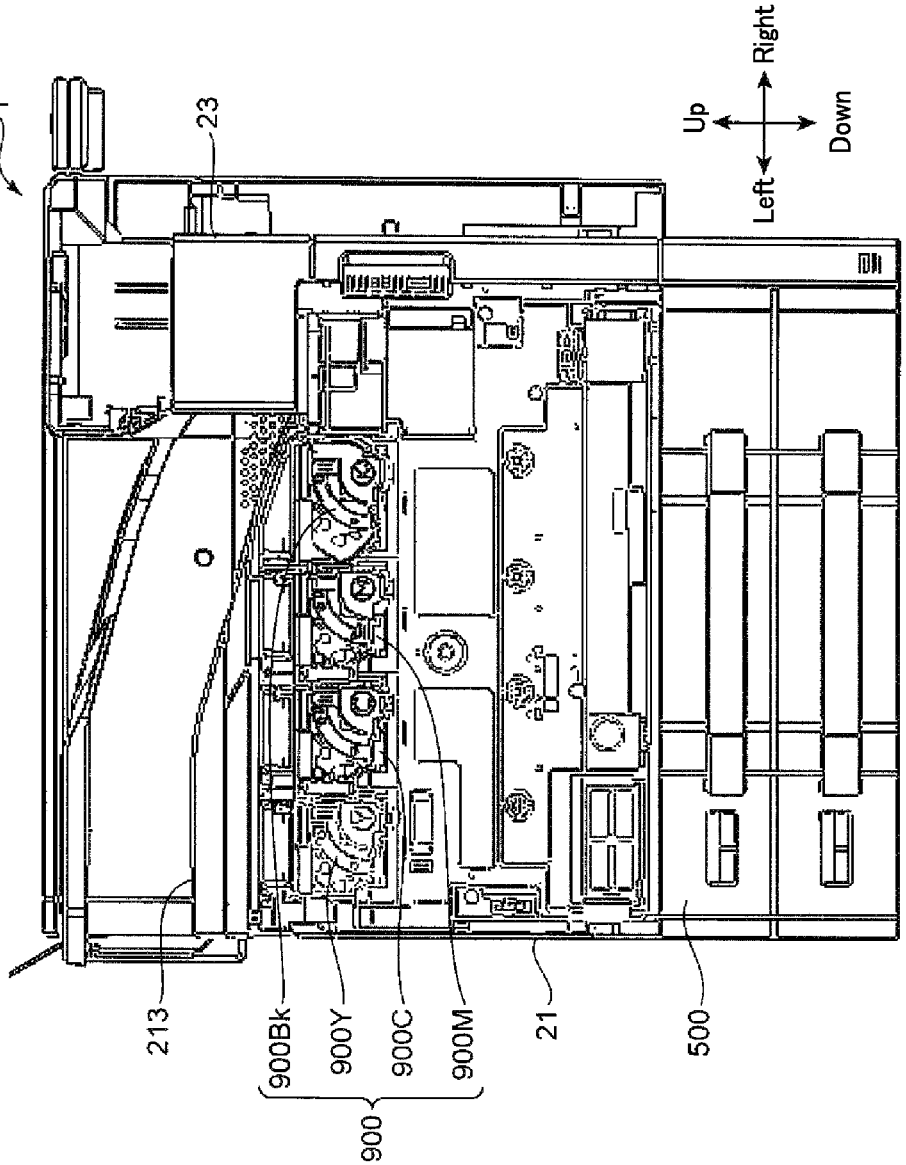


FIG. 3

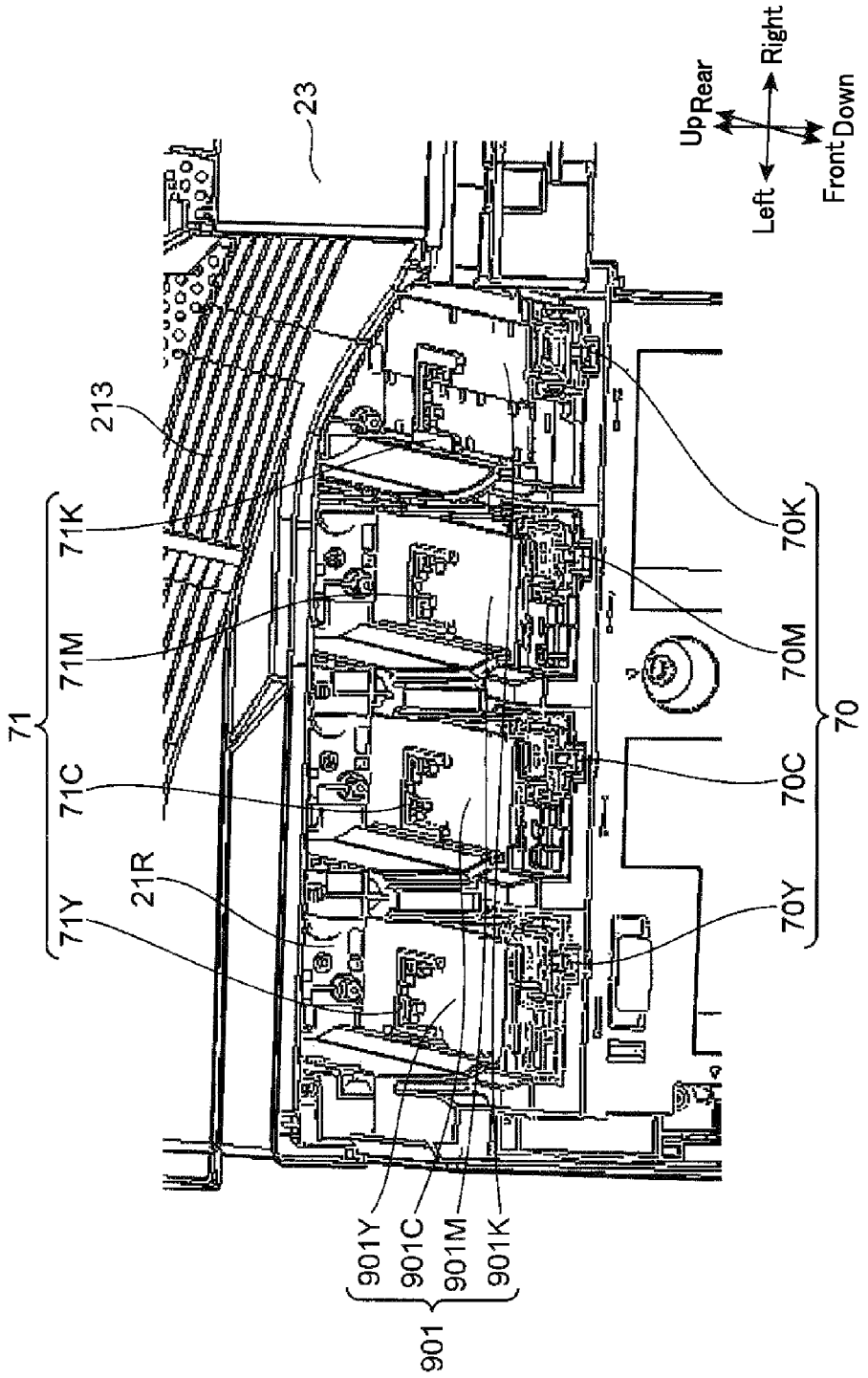

23
213
71
71K
71M
71C
71Y
21R
901
901Y
901C
901M
901K
70
70K
70M
70C
70Y
Up
Rear
Right
Left
Front
Down

FIG. 4

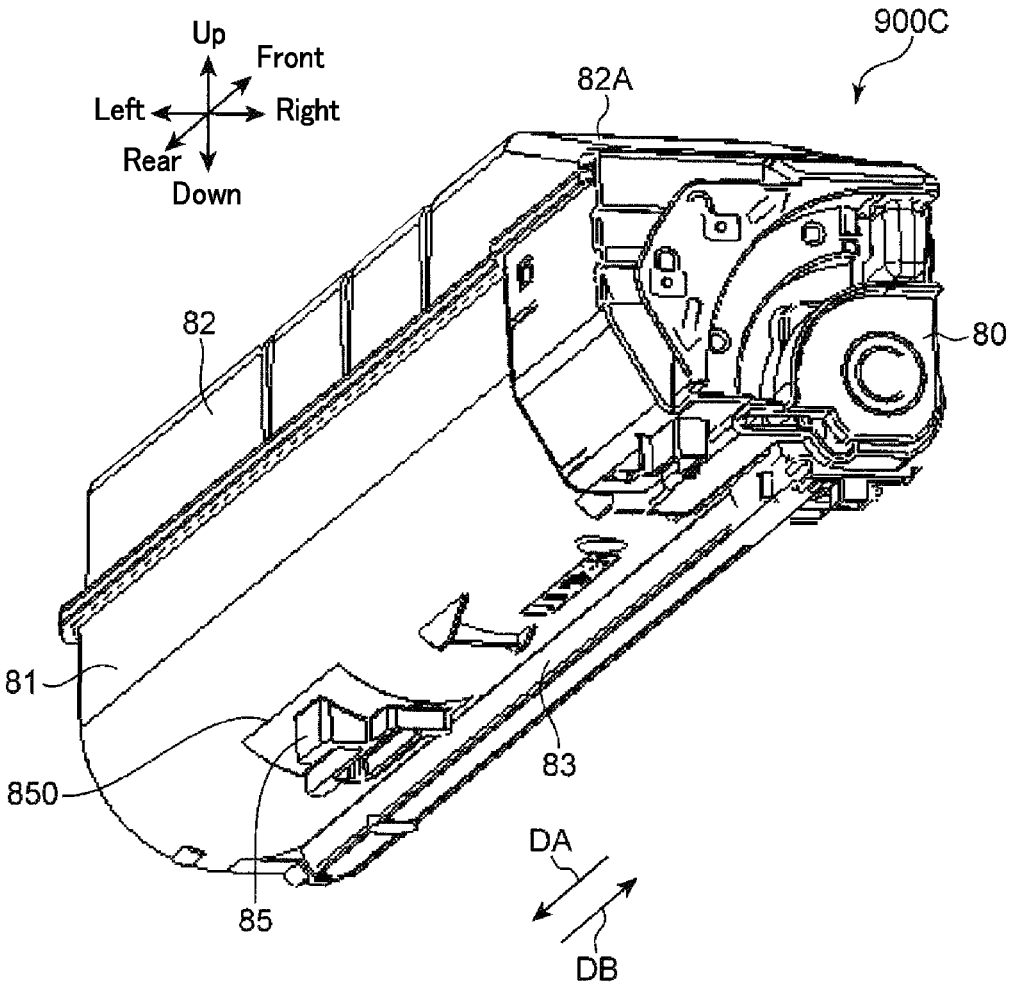


FIG. 5

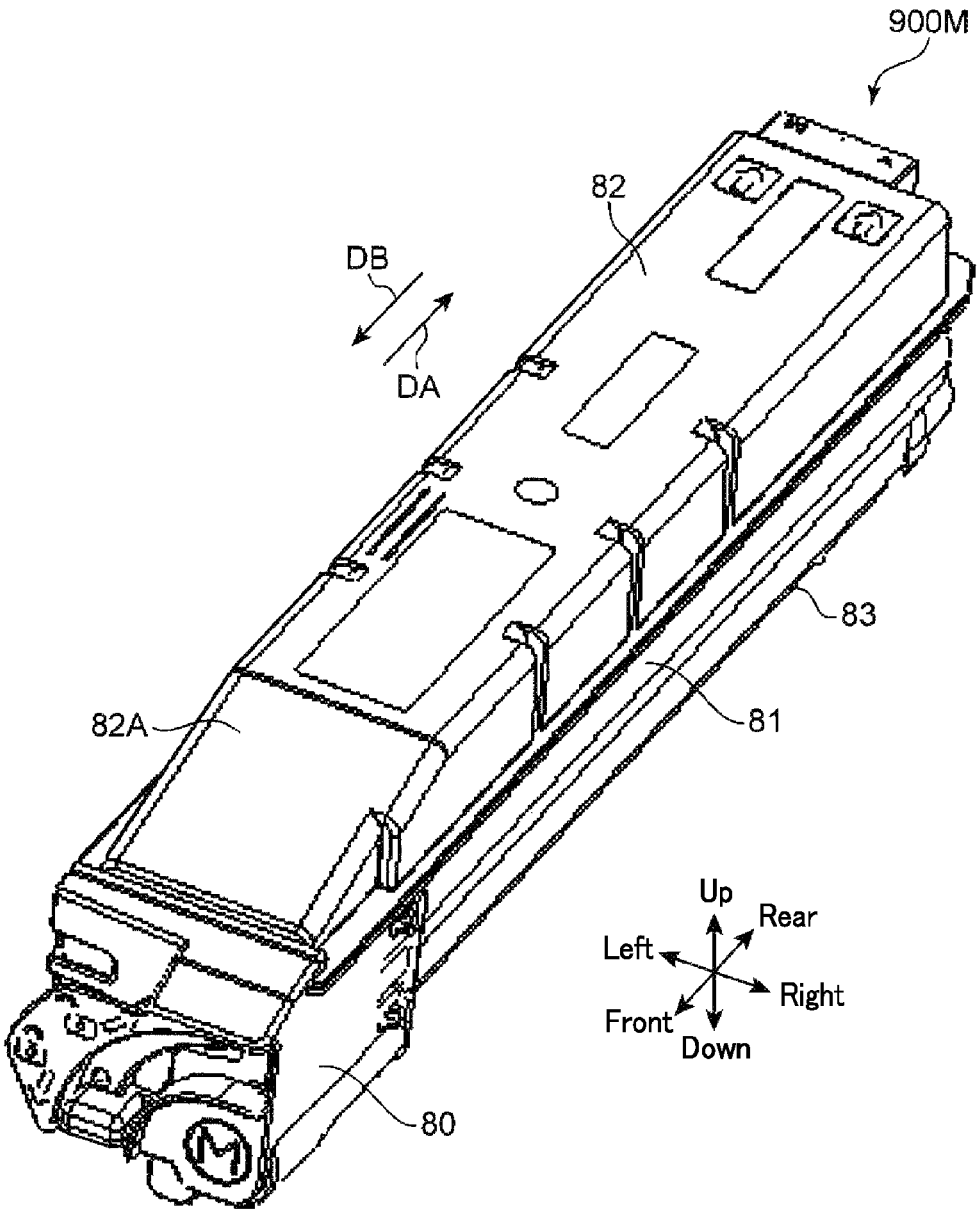


FIG. 6

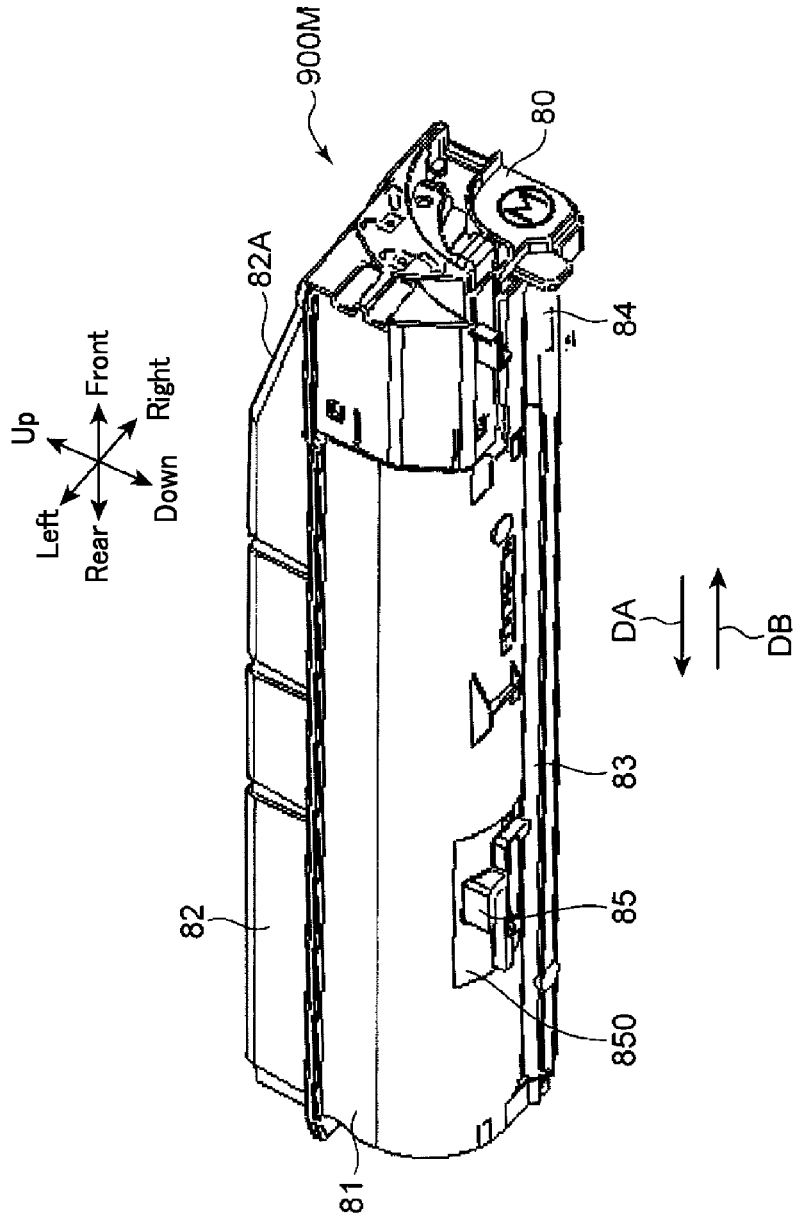

900M
80
82A
84
Up
Front
Right
Left
Rear
Down
DA
DB
83
82
85
850
81

FIG. 7

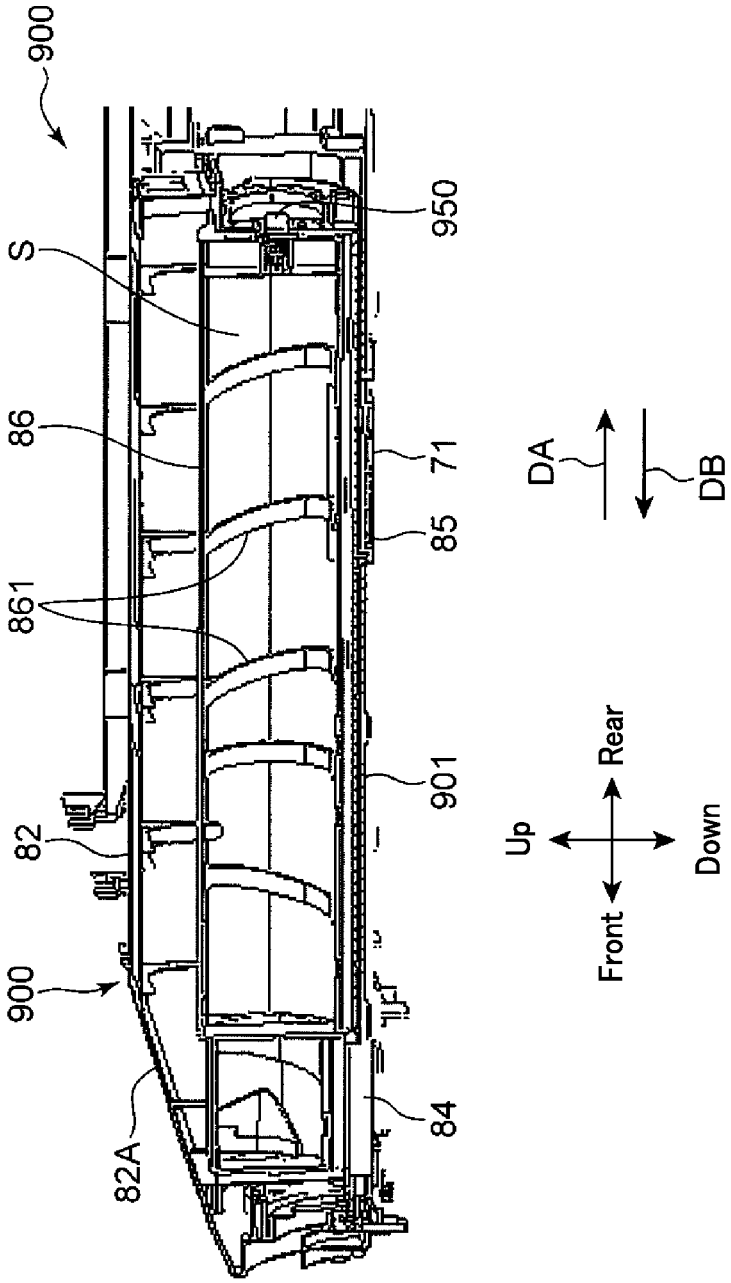


FIG. 8

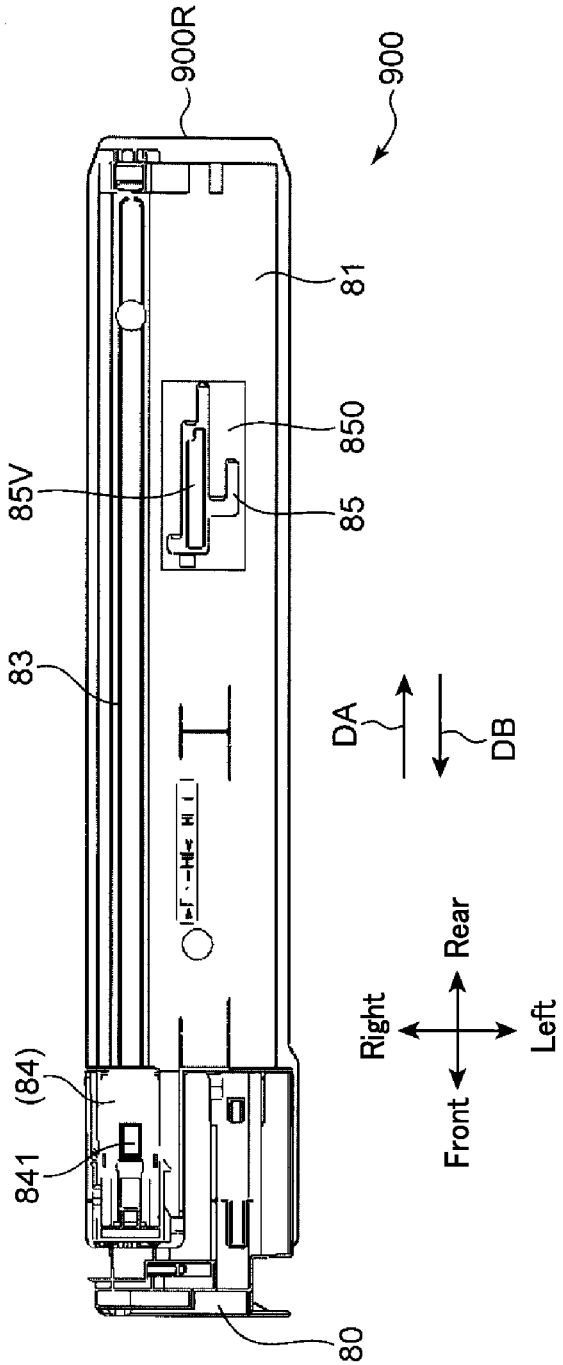


FIG. 9

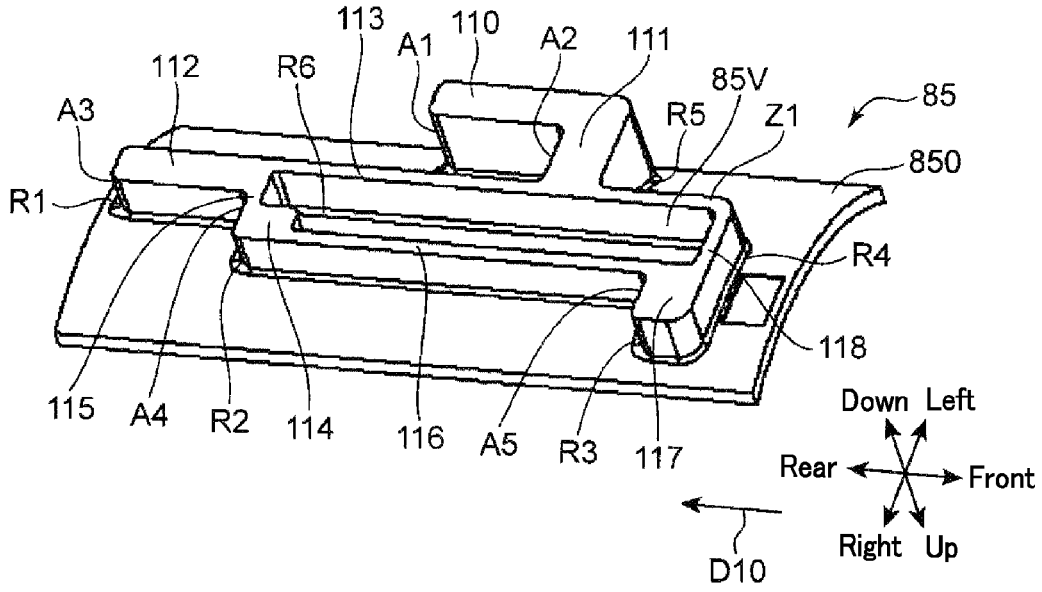

113
110
A1
A2
111
112
R6
85V
85
A3
R5
Z1
850
R1
R4
118
115
A4
R2
114
116
A5
R3
117
Down Left
Rear
Front
Right Up
D10

FIG. 10

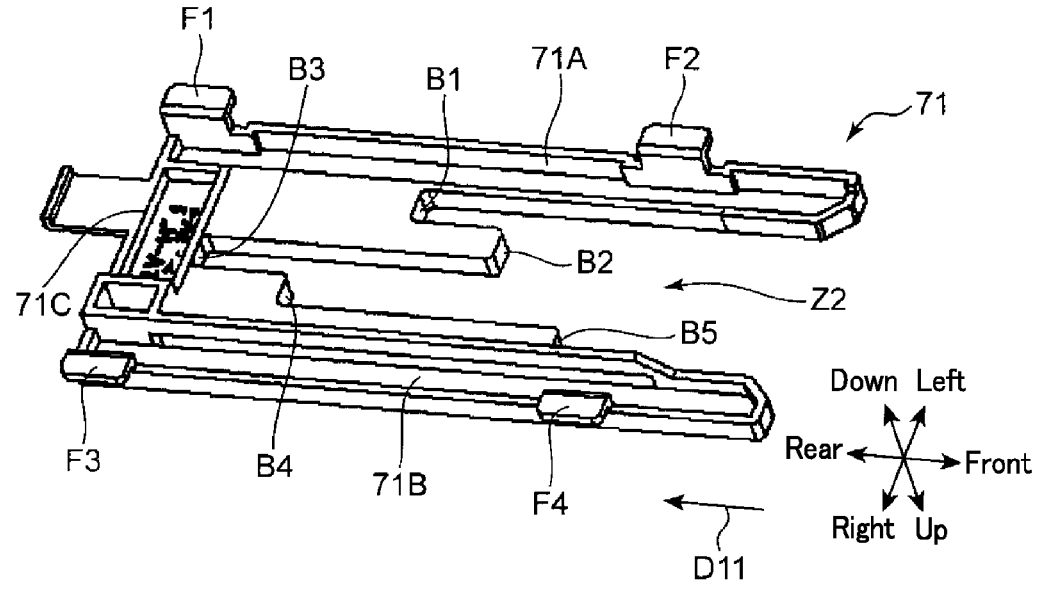

F1
B3
B1
71A
F2
71
B2
71C
Z2
B5
Down Left
Rear
Front
Right Up
F3
B4
71B
F4
D11

FIG. 11

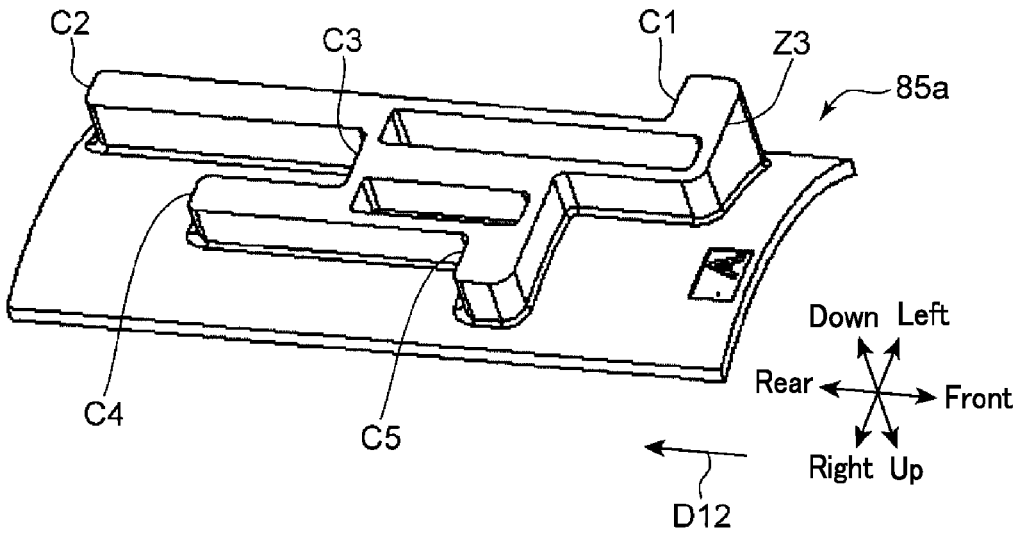

C2
C3
C1
Z3
85a
C4
C5
Down Left
Rear
Front
Right Up
D12

FIG. 12

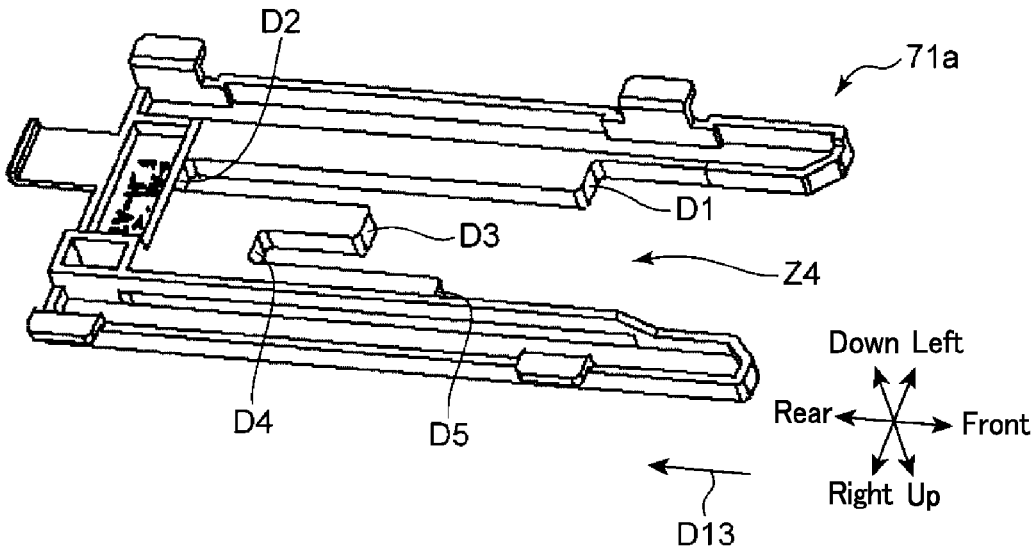

D2
71a
D1
D3
Z4
D4
D5
Down Left
Rear
Front
Right Up
D13

FIG. 13

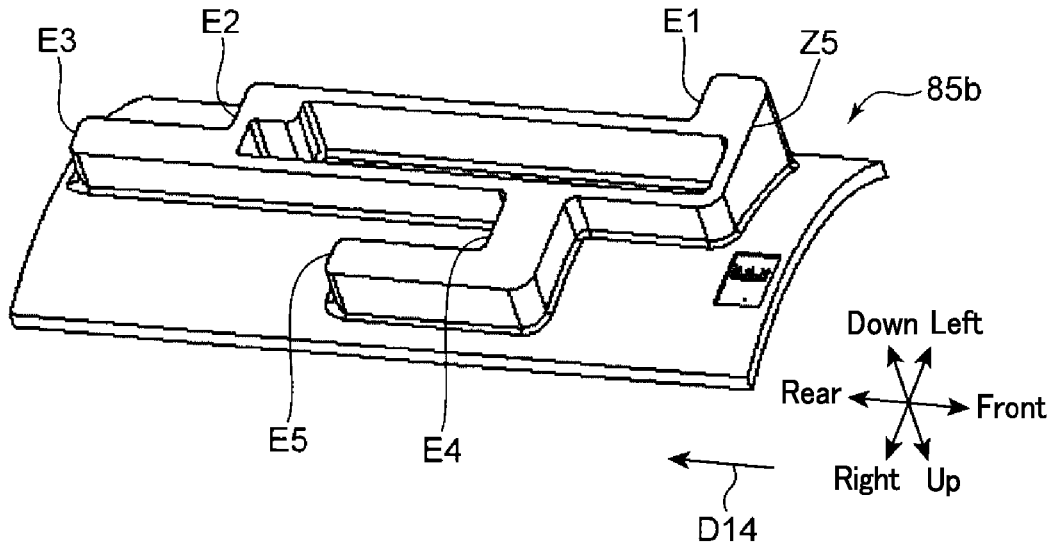

E3
E2
E1
Z5
85b
E5
E4
Down Left
Rear
Front
Right Up
D14

FIG. 14

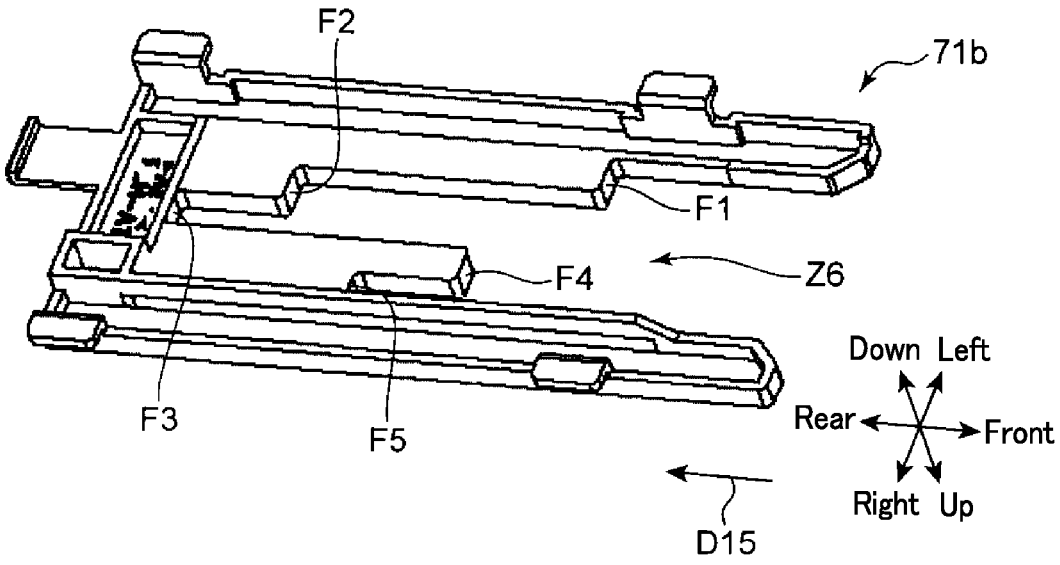

F2
71b
F1
F4
Z6
F3
F5
Down Left
Rear
Front
Right Up
D15

FIG. 15

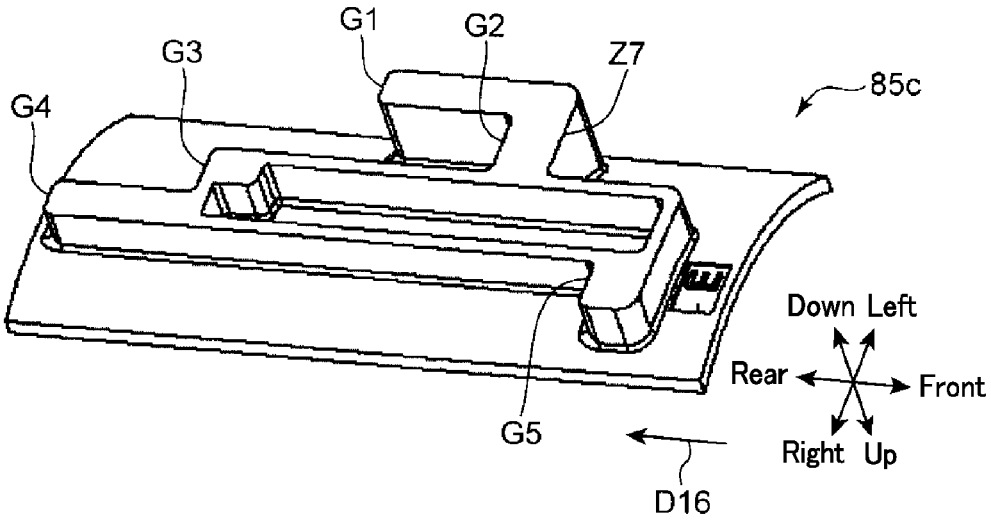

G1
G2
G3
Z7
85c
G4
Down Left
Rear
Front
G5
Right Up
D16

FIG. 16

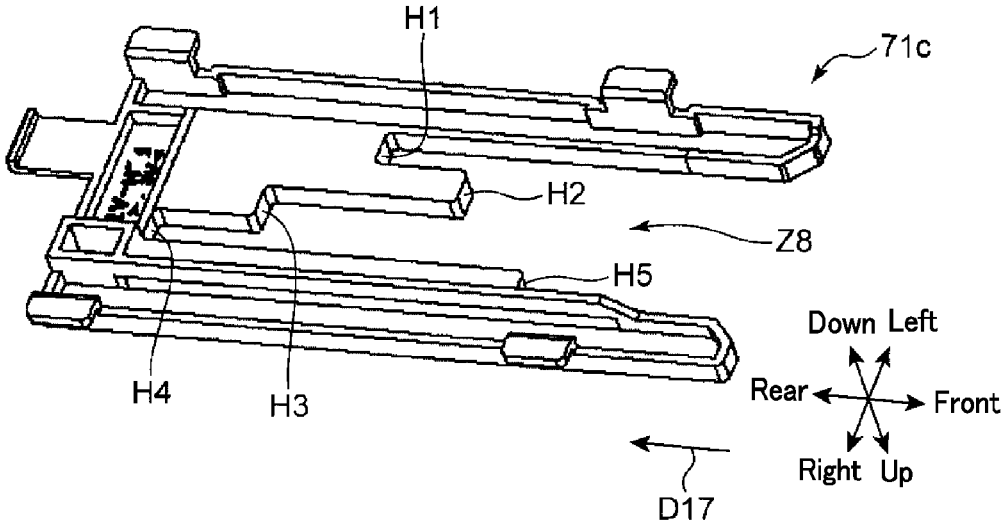

H1
71c
H2
Z8
H5
Down Left
Rear
Front
H4
H3
Right Up
D17

FIG. 17

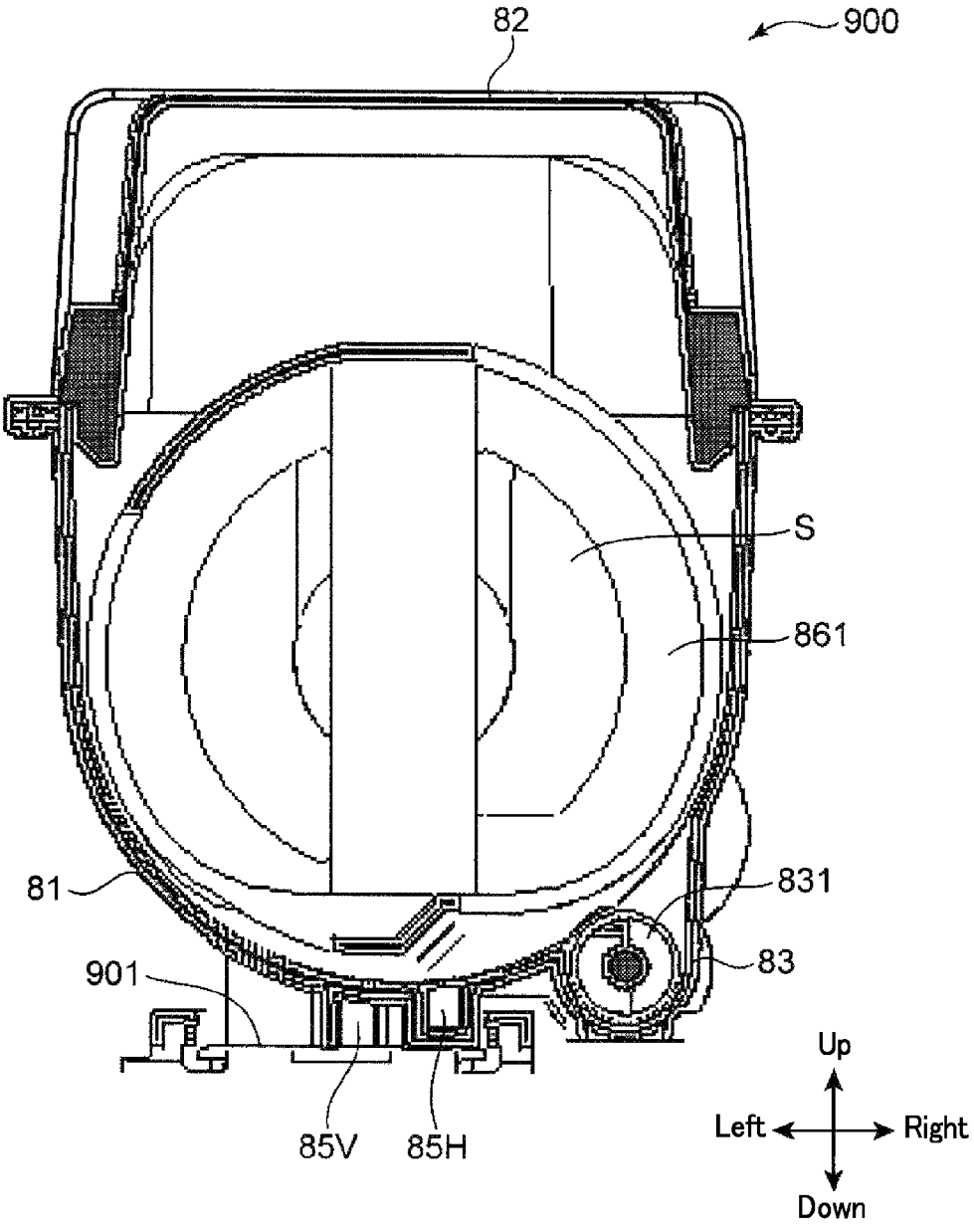


FIG. 18

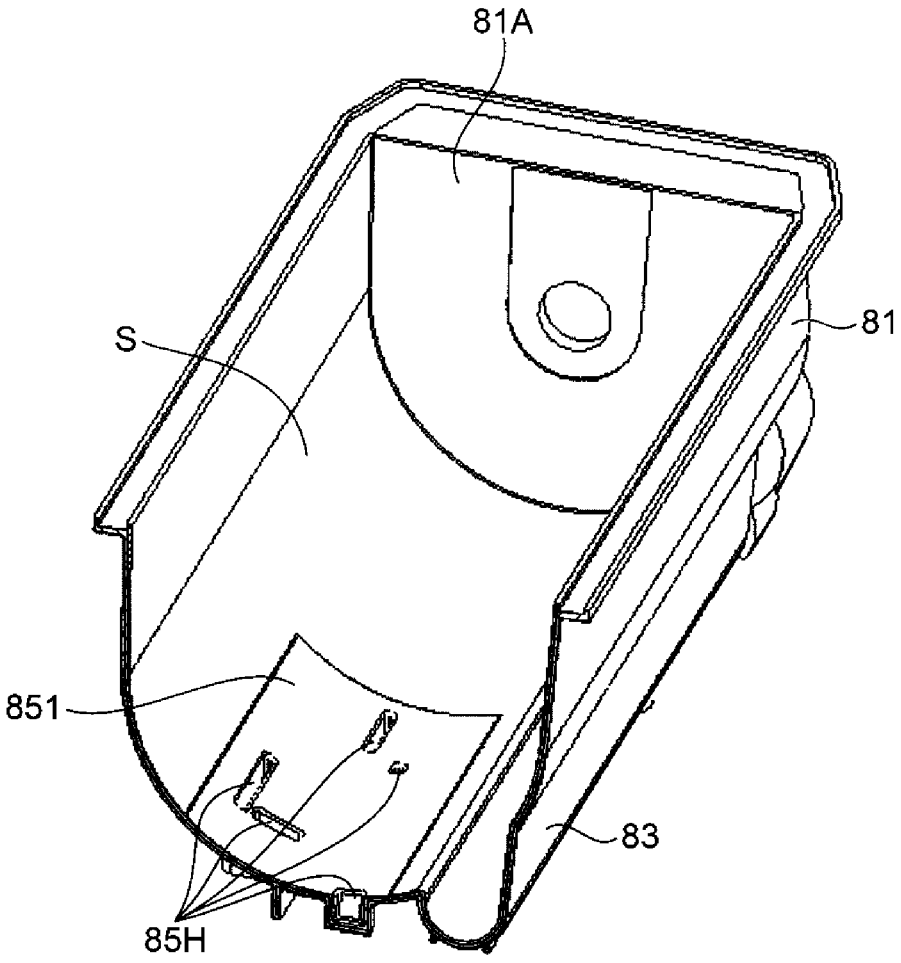


FIG. 19

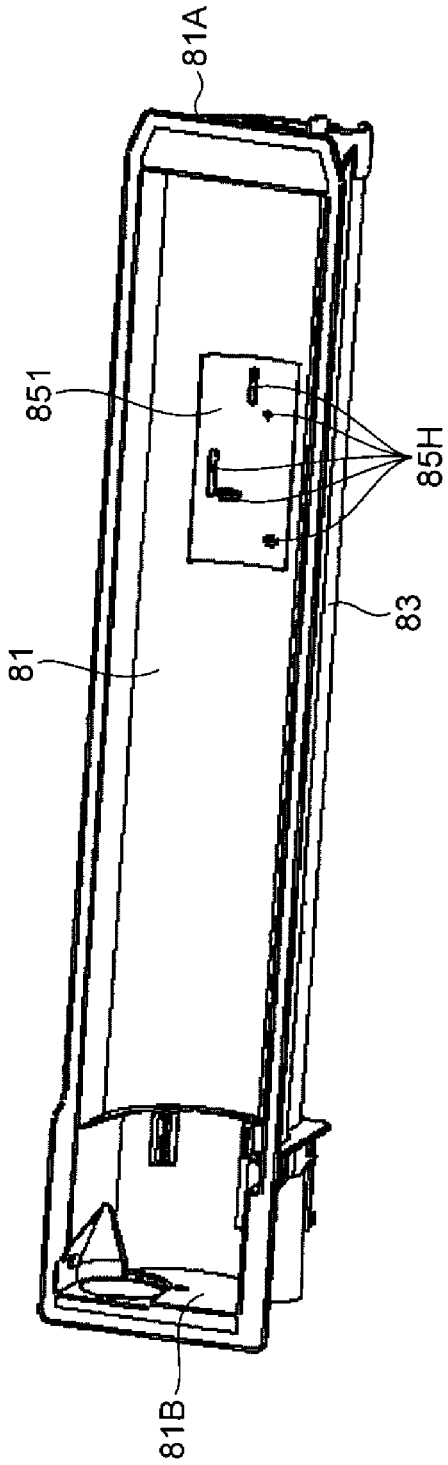


FIG.20

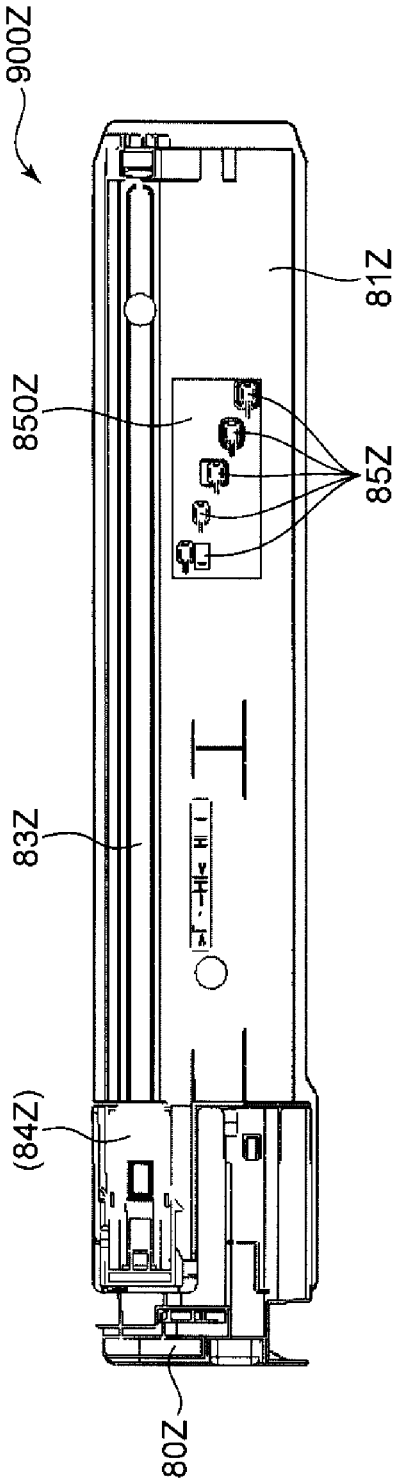


FIG.21

DEVELOPER CONTAINER, DEVELOPING DEVICE INCLUDING DEVELOPER CONTAINER, AND IMAGE FORMING APPARATUS INCLUDING DEVELOPING DEVICE

INCORPORATION BY REFERENCE

The present application claims priority under 35 U.S.C. §119 to Japanese Patent Application No. 2012-086943, filed Apr. 6, 2012. The contents of this application are incorporated herein by reference in their entirety.

BACKGROUND

The present disclosure relates to a developer container suitable for application to image forming apparatuses, such as copiers, printers, etc., a developing device including such a developer container, and an image forming apparatus including such a developing device.

Conventionally, in image forming apparatuses of electrographic type, a developing device visualizes as a toner image an electrostatic latent image formed on the surface of a photosensitive drum as an image carrier. The toner image is transferred to a recording medium (paper, a viewgraph, or the like), thereby performing image formation. In an image forming apparatus, when the amount of remaining toner in the developing device becomes less than a predetermined amount, toner is supplied from a toner container connected to the developing device.

When the toner container is emptied of the toner in image formation, the user replaces the toner container. In order to do so, the toner container is mounted detachably to the body of the image forming apparatus. The user removes the emptied old toner container from the body of the device. Then, the user fits a new toner container filled with toner to the device body.

Specifications for the toner container detachably mounted to the body of the image forming apparatus may be set differently depending on the type of the image forming apparatus, an operating environment, etc. The specifications may be set according to the country or area where the image forming apparatus is used, the printing speed of the device, the color and materials of the toner, etc. For this reason, if a new toner container set according to an inappropriate specification would be fitted in error in replacement of the toner container, malfunction of the device and/or degradation of print quality may be caused.

In view of the above, various techniques for prevention of erroneous fitting of the toner container are provided. For example, a plurality of protrusions are formed on the bottom surface of a toner container in some image forming apparatus. The arrangement of the plurality of protrusions differs according to the specification of the toner container. On the other hand, a sliding member is provided at a fitting part of the device body where the toner container is to be fitted. The sliding member includes a plurality of contact parts capable of being in contact with the plurality of projections. The plurality of contact parts of the sliding member are arranged correspondingly to the arrangement of the plurality of protrusions of the toner container. Accordingly, if the arrangement of the protrusions is different from that of the contact parts, the sliding member cannot be moved. Thus, the toner container is prevented from being fitted to the device body. Each arrangement of the protrusions and the contact parts is made differ according to the specification of the toner container to prevent erroneous fitting of the toner container.

SUMMARY

A developer container according to one aspect of the present disclosure 1 is fitted in a first direction to an image forming apparatus for forming an image on a sheet. The developer container includes a main body and a protrusion. An inner space filled with a developer is formed in the main body. The protrusion protrudes outward from an outer wall of the main body. The protrusion includes a plurality of wall surface parts facing in the first direction. An order in which the plurality of wall surface parts are arranged when viewed in the first direction is different from an order in which the plurality of wall surface parts are arranged when viewed in a second direction intersecting with the first direction. A plurality of wall parts are formed integrally to connect the plurality of wall surface parts through the plurality of wall parts.

A developing device according to another aspect of the present disclosure includes a developer container, a fitting part, and a developer housing. The developer container is configured to be filled with a developer. The developer container is fitted in a first direction to the fitting part. The developer is supplemented to the developer housing. The developer container includes a main body and a protrusion. An inner space filled with a developer is formed in the main body. The protrusion protrudes outward from an outer wall of the man body. The protrusion includes a plurality of wall surface parts facing in the first direction. An order in which the plurality of wall surface parts are arranged when viewed in the first direction is different from an order in which the plurality of wall surface parts are arranged when viewed in a second direction intersecting with the first direction. A plurality of wall parts are formed integrally to connect the plurality of wall surface parts through the plurality of wall parts. The fitting part includes an opposing member to which the protrusion of the developer container is fitted when the developer container is fitted in the first direction. The opposing member includes a plurality of opposing wall surface parts configured to face the plurality of wall surface parts of the protrusion in the first direction. The plurality of opposing wall surface parts of the opposing member has an arrangement pattern, which is the same as an arrangement pattern of the plurality of wall surface parts of the protrusion.

An image forming apparatus according to still another aspect the present disclosure includes the developing device according to the above other aspect, an image carrier, and a transfer section. The image carrier is configured to carry a developer image visualized by a developer supplied from the developing device as a latent image formed on a peripheral surface thereof. The transfer section configured to transfer the developer image from the image carrier to a sheet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an image forming apparatus according to one embodiment of the present disclosure.

FIG. **2** is a cross sectional view showing an internal configuration of the image forming apparatus.

FIG. **3** is a front view showing the locations of toner containers fitted to the image forming apparatus according to one embodiment of the present disclosure.

FIG. **4** is a cross-sectional perspective view showing part of the image forming apparatus where the toner containers are fitted according to one embodiment of the present disclosure.

FIG. **5** is a perspective view of a toner container according to one embodiment of the present disclosure.

FIG. **6** is a perspective view of a toner container according to one embodiment of the present disclosure.

FIG. **7** is a perspective view of a toner container according to one embodiment of the present disclosure.

FIG. **8** is a cross sectional view of a toner container according to one embodiment of the present disclosure.

FIG. **9** is a bottom view of a toner container according to one embodiment of the present disclosure.

FIG. **10** is a perspective view of a container protrusion according to one embodiment of the present disclosure.

FIG. **11** is a perspective view of a main body protrusion according to one embodiment of the present disclosure.

FIG. **12** is a perspective view of a container protrusion according to another embodiment of the present disclosure.

FIG. **13** is a perspective view of a main body protrusion according to another embodiment of the present disclosure.

FIG. **14** is a perspective view of a container protrusion according to still another embodiment of the present disclosure.

FIG. **15** is a perspective view of a main body protrusion according to yet another embodiment of the present disclosure.

FIG. **16** is a perspective view of a container protrusion according to further another embodiment of the present disclosure.

FIG. **17** is a perspective view of a main body protrusion according to still another embodiment of the present disclosure.

FIG. **18** is a cross sectional view of a toner container according to one embodiment of the present disclosure.

FIG. **19** is a cross-sectional perspective view showing part of the toner container according to one embodiment of the present disclosure.

FIG. **20** is a perspective view showing the inside of the toner container according to one embodiment of the present disclosure.

FIG. **21** is a bottom view of a toner container for comparison with the toner container according to one embodiment of the present disclosure.

DETAILED DESCRIPTION

Embodiments of the present disclosure will be described below with reference to the accompanying drawings. In the drawings, like numerals denote like or corresponding elements to omit the description thereof. It is noted that the term, "sheet(s)" in the following description means any of copier paper, coated paper, viewgraph, cardboard, post card, tracing paper, another sheet material to be subjected to image formation, and sheet material to be subjected to arbitrary processing other than the image formation.

FIG. **1** is a perspective view of an image forming apparatus according to one embodiment of the present disclosure. FIG. **2** is a diagram schematically showing the internal configuration of the image forming apparatus shown in FIG. **1**. The image forming apparatus shown in FIGS. **1** and **2** is a copier of generally called an inner output type. It is noted that in other embodiments, the image forming apparatus may be a printer, a facsimile machine, a multifunction peripheral having the functions of them, or any other device for forming a toner image on a sheet.

Referring to FIG. **1**, an image forming apparatus **1** includes a main housing **2** (a main body of the image forming apparatus **1**) having a substantially rectangular parallelepiped shape. The main housing **2** includes a lower housing **21**, an upper housing **22**, and a joint housing **23**. The lower housing **21** is substantially a rectangular parallelepiped in shape. The upper housing **22** is provided above the lower housing **21**. The joint housing **23** connects the lower housing **21** with the upper housing **22**. The joint housing **23** extends along the right edge and the back edge of the main housing **2**. The sheet subjected to printing is ejected to an ejection space **24** surrounded by the lower housing **21**, the upper housing **22**, and the joint housing **23**.

The image forming apparatus **1** includes an operation section **221**. The operation section **221** is provided at the upper housing **22** so as to protrude frontward of the image forming apparatus **1**. The operation section **221** includes, for example, an LCD touch panel **222**. The operation section **221** is capable of receiving information relating to image formation. The user may input, for example, the number of sheets to be printed, a print density, and the like through the LCD touch panel **222**. The upper housing **22** generally accommodates equipment for reading image of an original document and an electronic circuit that governs control of the entire image forming apparatus **1**.

The image forming apparatus **1** includes an original cover **223** arranged on the upper housing **22**. The original cover **223** is used for confining the original document. The original cover **223** is mounted at the upper housing **22** vertically rotatably about the rear edge of the upper housing **22** as an axis. The user turns the original cover **223** upward of the upper housing **22** and places the original document on the upper housing **22**. Then, the user can operate the operation section **221** to allow the equipment accommodated in the upper housing **22** to read the image of the original document.

A sheet tray **500**, which accommodates a plurality of sheets, is provided in the lower housing **21**. The sheet tray **500** is capable of being drawn from the lower housing **21** frontward of the image forming apparatus **1**. A sheet P accommodated in the sheet tray **500** is sent out upward of the image forming apparatus **1** within the lower housing **21**. On the basis of an instruction input through the operation section **221** by the user, image formation is performed on the sheet P within the housing **21**. Then, the sheet P is ejected into the ejection space **24**.

On the right surface of the lower housing **21**, a tray **212** is mounted so as to be openable/closable. As shown in FIG. **1**, when the tray **212** is positioned so as to protrude rightward from the lower housing **21**, the user can place the sheet on the tray **212**. After the sheet on the tray **212** is drawn into the lower housing **21**, image formation is performed on the sheet P on the basis of the instruction input through the operation section **221** by the user. Then, the sheet P is ejected into the ejection space **24**. When the tray **212** is turned upward about the lower edge of the tray **212** as an axis, the tray **212** is accommodated in an accommodation space **203**, which is recessed in the right surface of the lower housing **21**. Accordingly, a sheet supply port to draw the sheet inside the lower housing **21** is blocked.

The lower housing **21** accommodates various types of equipment for image formation on the sheet. Some of the equipment is exposed at the front of the image forming apparatus **1** by opening a front cover **21**A of the lower housing **21**. Further, the joint housing **23** accommodates various types of equipment to eject the sheet subjected to image formation into the ejection space **24**.

Referring to FIG. **2**, the upper housing **22** accommodates a scanning mechanism **224**. The user can allow the image forming apparatus **1** to read the image of a desired original document through the scanning mechanism **224**. A contact glass **225**, which is mounted on the upper surface of the upper

housing **22**, is provided over the scanning mechanism **224**. The original cover **223** is used for confining the original document placed on the contact glass **225**. When the user operates the image forming apparatus **1** through the operation section **221**, the scanning mechanism **224** scans and reads the image of the original document on the contact glass **225**. Analog information of the image read by the scanning mechanism **224** is converted to a digital signal. The image forming apparatus **1** forms an image onto the sheet on the basis of the digital signal.

The lower housing **21** accommodates toner containers **900** (a yellow toner container **900**Y, a magenta toner container **900**M, a cyan toner container **900**C, and a black toner container **900**Bk), an intermediate transfer unit **902** (a transfer section), an image forming section **903**, an exposure unit **904**, a fusing unit **97**, and a conveyance unit **3**. The joint housing **23** accommodates a paper exit unit **96**.

The image forming section **903** includes the toner containers **900** (the yellow toner container **900**Y, the magenta toner container **900**M, the cyan toner container **900**C, and the black toner container **900**Bk). A developing counter **10**Y, a developing counter **10**M, a developing counter **10**C, a developing counter **10**Bk are provided below the respective toner containers **900** of the respective colors of Y, M, C, and Bk.

The image forming section **903** includes four photosensitive drums **17** (image carriers) that correspond to the respective four colors of Y, M, C, and Bk. It is noted that in FIG. **2**, reference numerals for the photosensitive drums **17** for M, C, and Bk colors other than for the yellow color Y is omitted for the sake of simplicity. Each photosensitive drum **17** carries a toner image (a developer image) in the corresponding color. Photosensitive drums made of amorphous silicon (a-Si) based material are used as the photosensitive drums **17**.

A charger **16**, the developing counter **10** (**10**Y, **10**M, **10**C, or **10**Bk), a transfer unit **19**, and a cleaning unit **18** are arranged around each photosensitive drum **17**. It is noted that in FIG. **2**, reference numerals for the chargers, the transfer units, and the cleaning units arranged around the respective photosensitive drums for M, C, and Bk colors other than those for yellow color Y are omitted for the sake of simplicity. The charger **16** electrically charges the surface of the corresponding photosensitive drum **17** uniformly. After electrostatic charging, the exposure unit **904** exposes the surface of each photosensitive drum **17**, thereby forming an electrostatic latent image. The exposure unit **904** irradiates laser light on the basis of the digital signal generated by the scanning mechanism **224**.

Each of the developing counter **10**Y, the developing counter **10**M, the developing counter **10**C, and the developing counter **10**Bk develops (form visible images of or visualize) the electrostatic latent image formed on the peripheral surface of each photosensitive drum **17** with the use of corresponding color toner (developers) supplied from the yellow toner container **900**Y, the magenta toner container **900**M, the cyan toner container **900**C, or the black toner container **900**Bk, thereby forming a toner image (a developer image) on the photosensitive drum **17**. The transfer rollers **19** and the photosensitive drums **17** form nips to nip an intermediate transfer belt **921**. The transfer rollers **19** primarily transfer the toner images carried on the photosensitive drums **17** to the intermediate transfer belt **921**. The cleaning units **18** clean the peripheral surfaces of the photosensitive drums **17** after transfer of the toner images.

Each of the developing counter **10**Y, the developing counter **10**M, the developing counter **10**C, and the developing counter **10**Bk includes a developer housing **20**. Two-component developer is filled in the developer housing **20**. The two-component developer includes a magnetic carrier and toner. Further, two stirring rollers (a stirring roller **11** and a stirring roller **12**) are arranged in parallel in the vicinity of the bottom of the developer housing **20**. For example, the two stirring rollers (the stirring roller **11** and the stirring roller **12**) are arranged rotatably about their axes in the longitudinal direction of the rollers **11**, **12** as the axial direction.

A circulation path for the developer is formed in the inner bottom surface of the developer housing **20**. The stirring roller **11** and the stirring roller **12** are provided inside the circulation path. A partition wall **201** is provided in the axial direction between the stirring roller **11** and the stirring roller **12**. The partition wall **201** stands from the bottom of the developer housing **20** to define the circulation path. The circulation path is formed around the partition wall **201**. The two-component developer is conveyed through the circulation path, while being stirred by the stirring roller **11** and the stirring roller **12** in the circulation path. For example, the two-component developer is electrostatically charged while being stirred and conveyed.

The two-component developer circulates in the developer housing **20**, while being stirred by the stirring roller **11** and the stirring roller **12**, thereby electrostatically charging the toner of the two-component developer. The two-component developer on the stirring roller **11** is sucked to a magnetic roller **14** located above the stirring roller **11** to be conveyed. The sucked two-component developer forms a magnetic brush (not shown) on the magnetic roller **14**. A doctor blade **13** restricts the layer thickness of the magnetic brush. The magnetic brush supplies the toner to the developing roller **15** located above the magnetic roller **14**. The toner layer on the developing roller **15** is formed by the potential difference between the magnetic roller **14** and the developing roller **15**. The toner layer develops the electrostatic latent image on the photosensitive drum **17**.

It is noted that in FIG. **2**, reference numerals for the respective developer housings, the respective two stirring rollers, the respective partition walls, the respective magnetic rollers, the respective doctor blades of the developing counter **10**M, the developing counter **10**C, and the developing counter **10**Bk other than those of the yellow developing counter **10**Y are omitted for the sake of simplicity.

The exposure unit **904** includes a light source and various types of optical systems, such as a polygon mirror, a reflecting mirror, a deflection mirror, etc. The exposure unit **904** irradiates light based on image data to the peripheral surfaces of the photosensitive drums **17** provided in the image forming section **903** to form electrostatic latent images.

The intermediate transfer unit **902** includes the intermediate transfer belt **921**, a drive roller **922**, and a driven roller **923**. The toner images from the plurality of photosensitive drums **17** are applied and overlaid on the intermediate transfer belt **921** (primary transfer). In the secondary transfer section **98**, the overlaid toner images are secondarily transferred to the sheet supplied from the sheet tray **500** or the tray **212** (see FIG. **1**). The drive roller **922** and the driven roller **923** drive and rotate the intermediate transfer belt **921**. The drive roller **922** and the driven roller **923** are rotatably supported to the lower housing **21**.

It is noted that, for example, the intermediate transfer unit **902** (the transfer section) forms part of the secondary transfer section **98**. Accordingly, the intermediate transfer unit **902** has a function of transferring the toner images (developer images) from the photosensitive drums **17** (image carriers) to the sheet.

The fusing unit **97** fuses the toner images secondarily transferred on the sheet from the intermediate transfer unit

902. The sheet with a color image subjected to fusing is ejected toward the paper exit unit 96 formed above the fusing unit 97 (in the joint housing 23).

The paper exit unit 96 ejects the sheet conveyed from the fusing unit 97 onto the upper surface 213 of the lower housing 21 serving as an exit tray.

The conveyance unit 3 is provided at the lower housing 21 so as to face the sheet tray 500. The conveyance unit 3 includes a pickup roll 310, a paper supply roll 320, and a conveyance roller 330. When the pickup roll 310 and the paper supply roll 320 provided in the conveyance unit 3 are driven and rotated, the uppermost sheet of a sheaf of sheets in the sheet tray 500 is taken out sheet by sheet. Further, the taken-out sheet is send out by the conveyance roller 330 downstream of a sheet conveyance path 133 and is introduced into the image forming section 903. The pickup roll 310, the paper supply roll 320, and the conveyance roller 330 form part of the sheet conveyance path 133. The sheet is conveyed to the image forming section 903 through the sheet conveyance path 133.

Described in detail next will be the arrangement and configuration of the toner containers 900 in the image forming apparatus 1 according to the present embodiment. FIG. 3 is a front view showing the state when the front cover 21A (FIG. 1) of the image forming apparatus 1 is opened. FIG. 4 is a cross-sectional perspective view showing, in an enlarged scale, part around container insertion surfaces 901 when the toner containers 900 are taken out. FIG. 4 corresponds to a cross sectional view taken at substantially the central part of the image forming apparatus 1 in the front-back direction (direction orthogonal to the paper of FIGS. 2 and 3).

Referring to FIG. 3, the toner containers 900 (the yellow toner container 900Y, the magenta toner container 900M, the cyan toner container 900C, and the black toner container 900Bk) are arranged in parallel at regular intervals below the upper surface 213 of the lower housing 21. Referring to FIG. 4, a space where the toner containers 900 are fitted is formed in the lower housing 21. Container insertion surfaces 901 (a yellow container insertion surface 901Y, a magenta container insertion surface 901M, a cyan container insertion surface 901C, and a black container insertion surface 901Bk) (a fitting part) defines the bottom of the space. The toner containers 900 are pushed toward the rear side (a first direction) along the container insertion surfaces 901 to be inserted into the lower housing 21.

Toner ejection sections 70 are disposed below the container insertion surfaces 901. Supplemental toner is dropped from an opening 841 of each toner container 900, which will be described later, onto the corresponding toner ejection section 70. The supplemental toner is supplied to the developing counters 10 (the developing counter 10Y, the developing counter 10M, the developing counter 10C, and the developing counter 10Bk) from the toner ejection sections 70 through toner conveyance paths (not shown).

Further, main body protrusions 71 (a yellow main body protrusion 71Y, a magenta main body protrusion 71M, a cyan main body protrusion 71C, and a black main body protrusion 71Bk) (opposing member) are arranged at the back (on the rear side) of the container insertion surfaces 901. The main body protrusions 71 come in contact with container protrusions 85 (FIG. 5), which are formed on the toner containers 900, in the front-back direction. The main body protrusions 71 can prevent erroneous fitting of the toner containers 900.

Developing devices of the respective colors in the present embodiment include the developing counters 10, the container insertion surfaces 901, the main body protrusions 71, the toner containers 900 fitted on the container insertion surfaces 901, the toner conveyance paths (not shown), etc.

FIGS. 5-7 are perspective views of one of the toner containers 900. FIG. 8 is a cross sectional view of one of the toner containers 900 taken in the longitudinal direction of the toner container 900 and shows the state when the toner container 900 is fitted on one of the container insertion surfaces 901 of the lower housing 21. Further, FIG. 9 is a bottom view of the toner container 900. It is noted that, further in detail, FIG. 5 is a perspective view of the cyan toner container 900C, and FIGS. 6 and 7 are perspective views of the magenta toner container 900M. Since the cyan toner container 900C and the magenta toner container 900M are the same in shape and configuration, they are hereinafter referred to as a toner container 900. Furthermore, in FIGS. 5-9, the arrows DA indicate the direction where the toner container 900 is fitted to the image forming apparatus 1, and the arrows DB indicate the direction where the toner container 900 is taken out from the image forming apparatus 1.

The toner container 900 has a box shape extending in the front-back direction (the first direction) when it is fitted in the lower housing 21. The toner container 900 includes a front part 80, a main body part 81, a top plate 82, and a conveyance part 83. In addition, the toner container 900 includes a shatter 84 and the container protrusion 85.

The front part 80 serves as a covering member that defines the front of the toner container 900. The toner container 900 is substantially cylindrical in shape. The character Y, M, C, or K is engraved at the lower right part of the front surface of the front part 80 according to the color of the toner filled in the toner container.

The main body part 81 (a main body) extends on the rear side of the front part 80 in the longitudinal direction of the toner container 900. The main body part 81 serves as a main body part of the toner container 900. The main body part 81 forms an inner space S (see FIGS. 8, 18, and 19), in which the toner (developer) is filled. The main body part 81 has a substantially U-shape when viewed in cross section extending in the vertical and transverse directions.

The top plate 82 defines the upper part of the toner container 900. The top plate 82 covers each upper part of the front part 80 and the main body part 81 in the longitudinal direction of the toner container 900. The top plate 82 includes on the front side thereof a top plate front part 82A. The top plate front part 82A is formed so that the front part of the top plate 82 is inclined downward as it goes toward the front. The top plate front part 82A covers the upper part of the front part 80.

The conveyance section 83 is formed on the right side of the lower end of the main body part 81 in a fashion that the main body part 81 is raised downward in the longitudinal direction of the toner container 900. The conveyance section 83 is substantially in a U-shape when viewed in cross section extending in the vertical and transverse directions. The conveyance section 83 partially increases the inner space S of the main body part 81. A conveyance member 831 (FIG. 18) is disposed in the increased space. The conveyance member 831 conveys the toner filled in the inner space S in the longitudinal direction of the toner container 900. In the present embodiment, the conveyance member 831 conveys the toner from the rear side to the front side of the toner container 900.

The shatter 84 is arranged in front of the conveyance section 8 in the lower part of the main body part 813. The shatter 84 is capable of sliding in the longitudinal direction of the toner container 900. The shatter 84 covers the opening 841 (FIG. 9) formed in the lower surface of the main body part 81. When the toner container 900 is fitted in the lower housing 21, the shatter 84 is moved and slid frontward. This exposes the

opening **841** downward. The toner, which is conveyed frontward in the toner container **900** by the conveyance member **831**, is dropped into the toner ejection section **70** through the opening **841**.

The container protrusion **85** (protrusion) is formed on the lower surface of the main body part **81** on the rear side of the central part of the main body part **81** in the longitudinal direction (the front-back direction) of the toner container **900**. In other words, the container protrusion **85** is formed on part of the main body part **81**, which is closer to one (a rear surface **81**A in FIG. **20**) of the end parts of the main body **81** than the other end part (front surface **81**B in FIG. **20**). The one end part (the rear surface **81**A) of the main body part **81** is inserted earlier than the other end part (the front surface **81**B) of the main body part **81** in fitting the toner container **900** into the image forming apparatus **1**.

In the present embodiment, the container protrusion **85** protrudes downward at part of the main body part **81**. Combination of the container protrusion **85** and the main body protrusion **71** can prevent the toner container **900** from being fitted erroneously into the lower housing **21**. The shape and configuration of the container protrusion **85** will be described later with reference to FIGS. **10**-**20**.

The toner container **900** further includes a stirring section **86** (FIG. **8**). The stirring section **86** is driven and rotated in the inner space S of the toner container **900**. The stirring section **86** includes raking portions **861**. The raking portions **861** are wings disposed at plural points in the longitudinal direction of the stirring section **86**. Further, the raking portions **861** are arranged with inclination at a predetermined angle with respect to the longitudinal direction of the toner container **900**. By rotation of the raking portions **861**, the toner filled in the inner space S is moved in the longitudinal direction of the toner container **900** toward the conveyance member **831** when viewed in cross section of the toner container **900**. A drive/transmission section **950** is disposed at the rear part of the toner container **900**. The drive/transmission section **950** is connected to a drive section (not shown) disposed in the lower housing **21** of the image forming apparatus **1** to transmit rotational drive power to the stirring section **86**.

Detailed description will be made next about the configurations of the container protrusion **85** and the main body protrusion **71**. FIG. **10** is a perspective view of the container protrusion **85**. FIG. **11** is a perspective view of the main body protrusion **71**. FIG. **10** is an enlarged view of the container protrusion **85** formed on the lower surface of the main body part **81** of the toner container **900**. That is, FIG. **10** shows the state where the toner container **900** is turned over upside down.

The container protrusion **85** is formed on a protrusion forming surface **850** (FIGS. **5** and **7**) in the lower surface of the main body part **81**. It is noted that the container protrusion **85** may be fixed to the toner container **900** as a separate member. However, in the present embodiment, the container protrusion **85** is integrally formed with the main body part **81** in molding the main body part **81**.

The container protrusion **85** protrudes downward from the outer wall of the main body part **81**. In other words, the container protrusion **85** is a protrusion member protruding from the main body part **81** of the toner container **900** outward of the outer wall of the main body part **81**. The container protrusion **85** includes five contact parts (an eleventh contact part A**1**, a twelfth contact part A**2**, a thirteenth contact part A**3**, a fourteenth contact part A**4**, and a fifteenth contact part A**5**), each of which is a wall surface part. Each of the five contact parts is a wall surface part of the container protrusion **85**, which faces in a direction opposite to an insertion direction (the direction of the arrow DA in FIG. **5** and the direction of the arrow D**10** in FIG. **10**) (the first direction) of the toner container **90** into the lower housing **21**. The eleventh contact part A**1**, the twelfth contact part A**2**, the thirteenth contact part A**3**, the fourteenth contact part A**4**, the fifteenth contact part A**5** are arranged in this order from left to right in the transverse direction (a second direction) of the container protrusion **85**.

Further, in the present embodiment, the five contact parts are arranged so that the thirteenth contact part A**3** is formed at the rearmost part, and the fourteenth contact part A**4**, the eleventh contact part A**1**, the twelfth contact part A**2**, and the fifteenth contact part A **5** are formed in this order in the front-back direction (the first direction) of the container protrusion **85**. That is, the five contact parts form an arrangement pattern in which the positions of the five contact parts are different between when viewed in the front-back direction (the first direction) and when viewed in the transverse direction (the second direction). In other words, the order in which the contact parts A**1**-A**5** are arranged in the transverse direction (the second direction) is different from the order in which the contact parts A**1**-A**5** are arranged in the front-back direction (the first direction) intersecting with the transverse direction. That is, the order in which the contact parts A**1**-A**5** are arranged when viewing the container protrusion **85** in the front-back direction (the first direction) is different from the order in which the contact parts A**1**-A**5** are arranged when viewing the container protrusion **85** in the transverse direction (the second direction) intersecting with the front-back direction.

Further, the container protrusion **85** is in an integrally protruding shape that connects the five contact parts together. The container protrusion **85** is composed of a plurality of wall parts. Some of the plurality of wall parts stand in the insertion direction of the toner container **900** to form a first wall group. The other wall parts of the plurality of wall parts stand in the transverse direction (a direction orthogonal to the insertion direction of the toner container **900**) to form a second wall group. Referring to FIG. **10**, the container protrusion **85** includes a first wall part **110**, a second wall part **111**, a third wall part **112**, a fourth wall part **113**, a fifth wall part **114**, a sixth wall part **115**, a seventh wall part **116**, an eighth wall part **117**, and a ninth wall part **118**.

The first wall part **110** is formed at a left end part of the container protrusion **85** in the insertion direction of the toner container **900** so as to have a predetermined width in the transverse direction. The eleventh contact part A**1** corresponds to the rear wall surface of the first wall part **110**. The second wall part **111** is connected to the front end of the first wall part **110**. The second wall part **111** is formed from the front end of the first wall part **110** toward the right. The twelfth contact part A**2** corresponds to the rear wall surface of the second wall part **111**. The third wall part **112** is formed on the right side of the first wall part **110** and on the rear side of the rear end of the first wall part **110** in the insertion direction of the toner container **900** so as to have a predetermined width in the transverse direction. The thirteenth contact part A**3** corresponds to the rear wall surface of the third wall part **112**.

The fourth wall part **113** is formed from the front end of the third wall part **112** to the front side of the front end of the first wall part **110** in the insertion direction of the toner container **900**. The fourth wall part **113** has a width in the transverse direction smaller than the third wall part **112**. In other words, the fourth wall part **113** is formed by extending part of the front end of the third wall part **112** frontward. The fourth wall part **113** is connected to the second wall part **111** at substantially the central part thereof in the front-back direction. The

fifth wall part **114** is a wall part formed on the right front side of the third wall part **112** so as to slightly extend in the front-back direction. The fourteenth contact part A**4** corresponds to the rear wall surface of the fifth wall part **114**.

The sixth wall part **115** is a wall part that connects the front end of the third wall part **112** to the rear end of the fifth wall part **114** in the transverse direction. The seventh wall part **116** is formed from the front end of the fifth wall part **114** in parallel to the fourth wall part **113** (the front-back direction). The seventh wall part **116** is formed so as to reach part on the front side of the second wall part **111** in the front-back direction. The eighth wall part **117** is located on the right side of the seventh wall part **116** and is connected to the front end of the seventh wall part **116**. The eighth wall part **117** is a wall part substantially in a rectangular parallelepiped shape. The fifteenth contact part A**5** corresponds to the rear wall surface of the eighth wall part **117**. The ninth wall part **118** is a wall part that connects the front end of the eighth wall part **117** to the front end of the fourth wall part **113** in the transverse direction.

Accordingly, the five contact parts (the eleventh contact part A**1**, the twelfth contact part A**2**, the thirteenth contact part A**3**, the fourteenth contact part A**4**, and the fifteenth contact part A**5**) are formed integrally so as to be connected together through the first wall part **110**, the second wall part **111**, the third wall part **112**, the fourth wall part **113**, the fifth wall part **114**, the sixth wall part **115**, the seventh wall part **116**, the eighth wall part **117**, and the ninth wall part **118**. That is, the wall parts **110**-**118** are formed integrally to connect the five contact parts through the wall parts **110**-**118**. In this case, the first wall part **110**, the third wall part **112**, the fourth wall part **113**, the fifth wall part **114**, the seventh wall part **116**, and the eighth wall part **117** are the wall parts (the first wall group) formed in the insertion direction of the toner container **900** (the first direction). On the other hand, the second wall part **111**, the sixth wall part **115**, and the ninth wall part **118** are the wall parts (the second wall group) formed in the direction (the transverse direction, the second direction) orthogonal to (intersecting with) the insertion direction of the toner container **900**.

Thus, integral formation of the five contact parts with the wall groups orthogonal to each other can definitely maintain the rigidity of the container protrusion **85**. Further, in the present embodiment, the five contact parts are adjacent to one another in the transverse direction. In other words, when viewing the five contact parts in the front-back direction, the five contact parts are arranged adjacent to one another. Accordingly, the container protrusion **85** can be reduced in size in the transverse direction as far as possible. Further, the five contact parts can be prevented from being arranged separately in the transverse direction, thereby maintain rigidity of each contact part at high level. The five contact parts are formed continuously to form a protruding shape Z**1** (an outer shape of the container protrusion **85** in cross section extending in the front-back and transverse directions) on the lower end surface of the container protrusion **85**.

Referring to FIG. **11**, the main body protrusion **71** is substantially in a turned angular U shape. The outer shape of the main body protrusion **71** is defined by a protruding left end part **71**A, a protruding right end part **71**B, and a protruding base end part **71**C. The protruding base end part **71**C is a wall part in a thin plate shape formed at the rear part of the main body protrusion **71** so as to extend in the transverse direction. The protruding left end part **71**A and the protruding right end part **71**B are formed at respective ends in the transverse direction of the protruding base end part **71**C so as to extend frontward.

The protruding left end part **71**A includes a first protruding piece F**1** and a second protruding piece F**2**. Further, the protruding right end part **71**B includes a third protruding piece F**3** and a fourth protruding piece F**4**. The first protruding piece F**1** is formed at the rear end part of the protruding left end part **71**A. The first protruding piece F**1** is a protruding piece protruding leftward from the lower end of the protruding left end part **71**A. Further, the second protruding piece F**2** is formed between the central part in the front-back direction of the protruding left end part **71**A and the front end of the protruding left end part **71**A. Similar to the first protruding piece F**1**, the second protruding piece F**2** is also a protruding piece protruding leftward from the lower end of the protruding left end part **71**A. Furthermore, the third protruding piece F**3** and the fourth protruding piece F**4** of the protruding right end part **71**B are arranged so as to oppose to the first protruding piece F**1** and the second protruding piece F**2**, respectively. The third protruding piece F**3** and the fourth protruding piece F**4** are protruding pieces protruding rightward from the lower end of the protruding right end part **71**B. In fixing the main body protrusion **71** to the container insertion surface **901**, the first protruding piece F**1**, the second protruding piece F**2**, the third protruding piece F**3**, and the fourth protruding piece F**4** are inserted in respective openings (not shown) formed in the container insertion surface **901**.

The main body protrusion **71** has a shape in which a plurality of plate members different from each other in length are adjacent to each other in the transverse direction and extend frontward from the front side surface of the protruding base end part **71**C. Accordingly, the main body protrusion **71** includes an eleventh contact receiving part B**1**, a twelfth contact receiving part B**2**, a thirteenth contact receiving part B**3**, a fourteenth contact receiving part B**4**, and a fifteenth contact receiving part B**5** (each being an opposing wall surface part). The five contact receiving parts are wall surfaces formed so as to face in the insertion direction of the toner container **900**. In other words, the five contact receiving parts are arranged so as to face to the corresponding contact parts of the container protrusion **85** of the toner container **900** in the front-back direction. The five contact receiving parts are different in position in the front-back direction and in the transverse direction.

In other words, the order in which the contact receiving parts B **1**-B**5** are arranged in the front-back direction (the first direction) is different from the order in which the contact receiving parts B**1**-B**5** are arranged in the transverse direction (the second direction) intersecting with the front-back direction. That is, the order in which the contact receiving parts B**1**-B**5** are arranged when viewing the main body protrusion **71** in the transverse direction (the second direction) is different from the order in which the contact receiving parts B**1**-B**5** are arranged when viewing the main body protrusion **71** in the front-back direction (the first direction) intersecting with the transverse direction. In the main body protrusion **71**, the shape of an insertion space Z**2**, which is formed in front of the five contact receiving parts, corresponds to the protruding shape Z**1** of the container protrusion **85**. That is, the five contact receiving parts form the same arrangement pattern as the five contact parts of the container protrusion **85**. Accordingly, when the toner container **900** is inserted to the container insertion surface **901**, the container protrusion **85** is fitted in the main body protrusion **71**.

The container protrusion **85** and the main body protrusion **71** with the above described shapes can prevent erroneous fitting of the toner container **900**. The toner container **900** is inserted in the direction indicated by the arrow D**11** in FIG. **11** to the main body protrusion **71** formed on the container inser-

tion surface **901**. In so doing, the container protrusion **85** of the toner container **900** is inserted in the direction indicated by the arrow D**10** in FIG. **10**. Then, when the toner container **900** is inserted up to the rear end of the container insertion surface **901**, the eleventh contact part A**1**, the twelfth contact part A**2**, the thirteenth contact part A**3**, the fourteenth contact part A**4**, and the fifteenth contact part A **5** of the container protrusion **85** simultaneously come in contact with the eleventh contact receiving part B**1**, the twelfth contact receiving part B**2**, the thirteenth contact receiving part B**3**, the fourteenth contact receiving part B**4**, and the fifteenth contact receiving part B**5** of the main body protrusion **71**, respectively.

At this time, the rear end part **900**R (FIG. **9**) of the toner container **900** is entirely fitted to the rear end part **21**R (FIG. **4**) of the lower housing **21**. Thus, the toner container **900** can be used in the image forming apparatus **1**, and the toner in the toner container **900** can be supplied to the developing counter **10** through the toner ejection section **70** (FIG. **4**).

FIGS. **12** and **13** are perspective views of a container protrusion **85***a* and a main body protrusion **71***a*, respectively. Both the container protrusion **85***a* and the main body protrusion **71***a* are used in combination likewise the container protrusion **85** and the main body protrusion **71**. The container protrusion **85***a* includes a twenty-first contact part C**1**, a twenty-second contact part C**2**, a twenty-third contact part C**3**, a twenty-fourth contact part C**4**, and a twenty-fifth contact part C**5**.

On the other hand, the main body protrusion **71***a* includes a twenty-first contact receiving part D**1**, a twenty-second contact receiving part D**2**, a twenty-third contact receiving part D**3**, a twenty-fourth contact receiving part D**4**, and a twenty-fifth-contact part D**5**. A protruding shape Z**3** that the container protrusion **85***a* has corresponds to an insertion space Z**4** formed by the main body protrusion **71***a*. Then, when a toner container **900** with the container protrusion **85***a* is inserted to the container insertion surface **901** (the arrow D**12** in FIG. **12** and the arrow D**13** in FIG. **13**), the twenty-first the contact part C**1**, the twenty-second contact part C**2**, the twenty-third contact part C**3**, the twenty-fourth contact part C**4**, and the twenty-fifth contact part C**5** of the container protrusion **85***a* substantially simultaneously come in contact with the twenty-first contact receiving part D**1**, the twenty-second contact receiving part D**2**, the twenty-third contact receiving part D**3**, the twenty-fourth contact receiving part D**4**, and the twenty-fifth contact receiving part D**5** of the main body protrusion **71***a*, respectively.

Similarly, FIGS. **14** and **15** are perspective views of a container protrusion **85***b* and a main body protrusion **71***b*, respectively. FIGS. **16** and **17** are perspective views of a container protrusion **85***c* and a main body protrusion **71***c*, respectively. In the combination of the container protrusion **85***b* and the main body protrusion **71***b* and the combination of the container protrusion **85***c* and the main body protrusion **71***c*, similarly to the above, the plural contact receiving parts substantially simultaneously come in contact with the plural contact parts in fitting the toner container **900**.

It is noted that in FIG. **14**, the protrusion **85***b* includes contact parts E**1**-E**5** and has a protrusion shape Z**5**, and the arrow D**14** indicates the insertion direction of the toner container **900**. In FIG. **15**, the main body protrusion **71***b* includes contact receiving parts F**1**-F**5** and has an insertion space Z**6**, and the arrow D**15** indicates the insertion direction of the toner container **900**.

Further, in FIG. **16**, the protrusion **85***c* includes contact parts G**1**-G**5** and has a protruding shape Z**7**, and the arrow D**16** indicates the insertion direction of the toner container **900**. In FIG. **17**, the main body protrusion **71***c* includes contact receiving parts H**1**-H**5** and has an insertion space Z**8**, and the arrow D**17** indicates the insertion direction of the toner container **900**.

Here, the orders in which the five contact parts are arranged in the front-back direction are different among the container protrusion **85**, **85***a*, **85***b*, and **85***c*.

Accordingly, when the arrangements of the five contact parts are set so as to differ according the specification of the toner container **900** and the specification of the image forming apparatus **1** to which the toner container **900** is fitted, the image quality can be maintained at high level in image formation by the image forming apparatus **1**. Examples of the specification of the toner container **900** may include but are not limited to the color, grain size, material, etc. of the toner filled in the toner container **900**. Further, examples of the specification of the image forming apparatus **1** may include but are not limited to the country where the image forming apparatus **1** is used, printing speed of the image forming apparatus **1**, etc.

It is noted that the orders in which the five contact parts are arranged in the transverse direction may be different among the container protrusions **85**, **85***a*, **85***b*, and **85***c* in addition to the orders in which the five parts are arranged in the front-back direction. Alternatively, only the orders in which the five contact parts are arranged in the transverse direction may be different among the container protrusions **85**, **85***a*, **85***b*, and **85***c*.

Referring to one example, the toner container **900** with the container protrusion **85** is filled with magenta toner MT exhibiting normal chromogenic property. By contrast, a toner container **900** (hereinafter denoted by **900***a*) with the container protrusion **85***a* is filled with magenta toner MTH exhibiting chromogenic property that is brighter than that of the magenta toner MT. The main body protrusion **71** is provided in the image forming apparatus **1**, which is capable of providing high image quality by setting in advance a preferable image condition for use of the magenta toner MT. On the other hand, the main body protrusion **71***a* is provided in another image forming apparatus **1** (hereinafter denoted by **1***a*), which is capable of providing high image quality similarly for use of the magenta toner MTH. Accordingly, when the toner container **900** is fitted in the image forming apparatus **1**, the container protrusion **85** and the main body protrusion **71** fit together. On the other hand, when the toner container **900***a* is fitted in the image forming apparatus la, the container protrusion **85***a* and the main body protrusion **71***a* fit together. Thus, image quality can be maintained at high level in both the image forming apparatus **1** and the image forming apparatus la.

By contrast, if the toner container **900** is fitted in the image forming apparatus **1***a* in error, the image quality by the image forming apparatus **1***a* may degrade. However, the combination of the container protrusion **85** and the main body protrusion **71***a* can prevent the toner container **900** from being fitted to the image forming apparatus **1***a*. Because, the container protrusion **85** (FIG. **10**) is formed on the toner container **900**, while the main body protrusion **71***a* (FIG. **13**) is formed on a container insertion surface **901***a* (not shown) of the image forming apparatus **1***a*.

When the toner container **900** is inserted along the container insertion surface **901***a*, the thirteenth contact part A**3** of the container protrusion **85**, which is located on the rearmost side, comes in contact with the twenty-third contact receiving part D**3** of the main body protrusion **71***a*. Then, this contact can prevent further insertion of the container protrusion **85** (the toner container **900**) rearward (backward) of the con-

tainer insertion surface **901***a* (the image forming apparatus **1***a*). Thus, the toner container **900** is effectively prevented from being erroneously fitted into the image forming apparatus **1***a*. In sum, according to the present embodiment, the plural contact parts of the container protrusion **85** are arranged so that the order in which the contact parts are arranged in the front-back direction is different from the order in which the contact parts are arranged in the transverse direction. Further, in the present embodiment, the toner container **900** (the container protrusion **85**) with the plural contact parts is capable of being fitted in and mating with the image forming apparatus **1** (the main body protrusion **71**) with the plural contact receiving parts arranged correspondingly to the plural contact parts.

Moreover, according to the present embodiment, the plural contact parts of the container protrusion **85** of the toner container **900** are connected together, thereby enabling exhibition of high rigidity. FIG. **21** is a bottom view of a toner container **900**Z for comparison with that in the present embodiment. Five container protrusions **85**Z are formed on a protrusion forming surface **850**A so as to independently protrude from a main body part **81**Z. With this configuration, if the toner container **900**Z is fitted to a non-corresponding image forming apparatus **1** in error, one of the contact receiving parts of the main body protrusion **71** of the image forming apparatus **1** comes in hard contact with one of the container protrusions **85**Z. This may results in breakage of the one of the container protrusions **85**Z. Alternatively, such fitting may cause deformation of the container protrusions **85**Z to allow the toner container **900**Z to be fitted into the inside of the image forming apparatus **1** in error with strong operation force.

By contrast, according to the present embodiment, as described above, the container protrusion **85** has the integral protrusion shape that connects the plural contact parts together. In particular, the wall groups of the container protrusion **85** orthogonal to each other integrally form the plural contact parts. Accordingly, high rigidity of the container protrusion **85** can be maintained. As described above, when the toner container **900** with the container protrusion **85** (FIG. **10**) is inserted along the container insertion surface **901***a* where the main body protrusion **71***a* (FIG. **13**) is formed, the thirteenth contact part A**3** of the container protrusion **85**, which is located on the rearmost side, comes in contact with the twenty-third contact receiving part D**3** of the main body protrusion **71***a*. At this time, the thirteenth contact part A**3** receives force in the direction opposite to the direction of the arrow D**10** in FIG. **10**. However, since the thirteenth contact part A**3** is supported by the third wall part **112**, the fourth wall part **113**, the sixth wall part **115**, etc., the container protrusion **85** can be prevented from being broken partially. Further, the container protrusion **85** can be prevented from riding on the main body protrusion **71***a*, thereby effectively preventing the toner container **900** from being fitted to the image forming apparatus **1***a* in error.

Furthermore, in the present embodiment, as shown in FIG. **10**, the container protrusion **85** protrudes on the protrusion forming surface **850** so as to form curved surfaces at corner areas where a plurality of wall parts intersect with the protrusion forming surface **850** (the outer wall of the main body part **81**). It should be noted that, of all corner areas, corner areas where the contact parts intersect with the protrusion forming surface **850** (corner areas corresponding to the contact parts) have a curved surface larger than the other corner areas. Details are given as follows.

The container protrusion **85** includes a first corner area R**1**, a second corner area R**2**, a third corner area R**3**, a fourth corner area R**4**, a fifth corner area R**5**, and a sixth corner area R**6**. The first corner area R**1** is a corner area where the thirteenth contact part A**3** intersects with the protrusion forming surface **850**. The second corner area R**2** is a corner area where the fourteenth contact part A**4** intersects with the protrusion forming surface **850**. Further, the third corner area R**3** is a corner area where the fifteenth contact part A**5** intersects with the protrusion forming surface **850**.

By contrast, the fourth corner area R**4** is a corner area where the front surface of the ninth wall part **118** intersects with the protrusion forming surface **850**. The fifth corner area R**5** is a corner area where the front surface of the second wall part **111** intersects with the protrusion forming surface **850**. The sixth corner area R**6** is a corner area where the right side surface of the fourth wall part **113** intersects with the protrusion forming surface **850**.

Referring to the above description, the first corner area R**1**, the second corner area R**2**, and the third corner area R**3** are corner areas corresponding to the respective contact parts and each have a curved shape (round shape) with a radius of 1.5 mm. By contrast, the fourth corner area R**4**, the fifth corner area R**5**, and the sixth corner area R**6** are the other corner areas each having a curved shape with a radius of 1 mm. Thus, the corner areas where the respective contact parts intersect with the protrusion forming surface **850** have large curved surfaces when compared to those of the other corner areas of the container protrusion **85**. Accordingly, each contact part can have increased strength against the protrusion forming surface **850**. Thus, breakage and deformation of each contact part can be effectively prevented.

Further, in the present embodiment, the shape of the container protrusion **85** can contribute to maintenance of the image quality of the image forming apparatus **1** to which the toner container **900** is fitted. FIG. **18** is a cross sectional view of the toner container **900**. FIG. **19** is a cross-sectional perspective view showing part on the rear end side of the main body part **81** of the toner container **900**. Further, FIG. **20** is a perspective view showing the inside of the toner container **900** as viewed from above.

In the present embodiment, inner recesses **85**H (space) are formed on the reverse (inner) side of the container protrusion **85** in a protrusion reverse surface **851**, which serves as the reverse surface of the protrusion forming surface **850**. For example, the inner recesses **85**H are formed on the reverse (inner) sides of the wall parts of the container protrusion **85** protruding from the protrusion forming surface **850**. Referring to FIG. **19**, for example, the inner recesses **85**H are formed on the reverse (inner) sides of the first wall part **110**, the second wall part **111**, the third wall part **112**, and the fifth wall part **114** of the container protrusion **85** in FIG. **10**. The inner recesses **85**H are formed inside the container protrusion **85** in a region outside the outer wall of the main body part **81**. Further, the inner recesses **85**H are a space communicating with the inner space S of the main body part **81**. By contrast, as shown in FIG. **10**, an outer recess **85**V is formed between the fourth wall part **113** and the seventh wall part **116**. In other words, the outer recess **85**V is surrounded and defined by the fourth wall part **113**, the third wall part **112**, the sixth wall part **115**, the fifth wall part **114**, the seventh wall part **116**, the eighth wall part **117**, and the ninth wall part **118**. Further, the outer recess **85**V is open outward of the main body part **81**.

The wall parts that define the outer recess **85**V include the third wall part **112** and the fifth wall part **114** which have the corresponding inner recesses **85**H. In other words, it can be said that the outer recess **85**V defines the inner recesses **85**H.

Here, the operator may forcibly fit the toner container **900**, on which the container protrusion **85** is formed, into the

image forming apparatus la, in which the main body protrusion **71***a* is formed. This operator's operation may scrape off the container protrusion **85** of the toner container **900**. In this case, as described above, in the image forming apparatus **1***a*, preferable image quality cannot be obtained with the magenta toner MH filled in the toner container **900**.

However, in this case, scraping off of the first wall part **110**, the second wall part **111**, the third wall part **112**, and the fifth wall part **115** of the container protrusion **85** opens the inner recesses **85**H to allow the inside and the outside of the toner container **900** to communicate with each other. This can cause the toner filled in the toner container **900** to leak outside through the inner recesses **85**H. Accordingly, the operator can recognizes that the inappropriate toner container **900**, of which the container protrusion **85** is scraped off, is fitted to the image forming apparatus **1***a*. Accordingly, the image forming apparatus **1***a* is prevented from forming an image with the magenta toner MH filled in the toner container **900**.

In particular, as described above, in the present embodiment, the container protrusion **85** is formed integrally with the main body part **81** of the toner container **900**. Specifically, in FIG. **18**, in order to form the main body part **81** of the toner container **900**, a mold for the main body part **81** is divided vertically. Accordingly, the outer recess **85**V is formed with a lower die, while the inner recesses **85**H are formed with an upper die.

In the above embodiments, the container protrusion **85** formed on the toner container **900** can effectively prevent the toner container **900** from being fitted erroneously in the image forming apparatus **1**. Combination of the container protrusion **85** with the main body protrusion **71** formed in the image forming apparatus **1** enables fitting of the toner containers **900** having different specifications to image forming apparatuses **1** in appropriate combination. In particular, the arrangements of the plural contact parts of the container protrusion **85** and the plural contact receiving parts of the main body protrusion **71** are made differ. This can provide the toner containers **900** that meet different specifications. In the arrangements, the plural contact parts on the container protrusion **85** are formed integrally so as to be connected together by the wall parts, thereby increasing the rigidity of them. Thus, even in fitting in erroneous combination of an image forming apparatus **1** and a toner container **900**, the plural contact parts formed on the container protrusion **85** can be prevented from being broken and deformed.

It is noted that the present disclosure is not limited to the above embodiments and can employ any of the following modifications, for example.

(1) The above embodiments describe but do not limit the arrangement in which the five contact parts and the five contact receiving parts corresponding to the contact parts are arranged in the container protrusion **85** and the main body protrusion **71**, respectively. The number of each of the contact parts and the contact receiving parts is not limited as far as it is plural.

(2) Further, the above embodiments describe but do not limit the arrangement in which the container protrusion **85** is formed on the lower surface of the toner container **900**. The container protrusion **85** may be formed on the upper surface or the side surface of the toner container **900**. Further, the container protrusion **85** may be formed on the rear wall surface of the toner container **900**. In these cases, the main body protrusion **71** is formed at a location facing the container protrusion **85** inside the image forming apparatus **1** correspondingly to the arrangement of the container protrusion **85**.

(3) Furthermore, the above embodiments describe but do not limit the toner container **900** as a unit with the container protrusion **85** which is configured to be fitted in the image forming apparatus **1**. A protrusion similar to the container protrusion **85** may be formed on each developer housing **20**. Even in this case, the main body protrusion **71** formed in the image forming apparatus **1** can be fitted to the protrusion formed on the developer housing **20**, thereby effectively preventing a developer housing **20** having a different specification from being fitted erroneously to the image forming apparatus **1**. In addition, protrusions similar to the container protrusion **85** may be formed on image forming units with the developer housings **20** of the respective colors. In this case, the protrusions similar to the main body protrusion **71** are formed on the developer housings **20**.

Thus, the toner containers **900** function as developer containers configured to be filled with the developer. The developer is also filled in the developer housings **20**. Accordingly, the developer housings **20** function as developer containers also.

(4) The above embodiments describe the corner areas R**1**-R**6** having curved surfaces. However, the shapes of the corner areas R**1**-R**6** are not limited to the curved shape but may be flat, for example.

(5) As described above, the contact parts (the wall surface parts) A**1**-A**5** are flat surfaces orthogonal to the insertion direction of the toner container **900** (the front-back direction). The contact receiving parts (opposing wall surface parts) B**1**-B**5** are also flat surfaces orthogonal to the insertion direction of the toner container **900** (the front-back direction). Accordingly, in fitting the toner container **900**, the contact parts come in face contact with the contact receiving parts. This means that impact per unit area applied to the contact parts in fitting the toner container **900** is small when compared with that in point contact and in line contact. This can contribute also to prevention of breakage and deformation of the contact parts.

What is claimed is:

1. A developer container, which is to be fitted in a first direction to an image forming apparatus for forming an image on a sheet, comprising:

a main body having an outer wall and an inner space filled with a developer;

an opening which is opened in a rear of a central part of the outer wall of the main body in the first direction and from which the developer filled in the inner space falls; and

a protrusion located in front of the central part of the outer wall of the main body in the first direction and protruding outward from the outer wall of the main body,

wherein the protrusion includes a plurality of wall parts,

each of the wall parts includes, at a front end of the wall part in the first direction, a wall surface part extending in a second direction which is in orthogonal to said first direction,

the wall surface parts of the wall parts are ordered as a first order from a wall surface part located at a front end part in the first direction among the wall surface parts to a wall surface part located at a rear end part in the first direction among the wall surface parts, and ordered as a second order from a wall surface part located at a front end part in the second direction among the wall surface parts to a wall surface part located at a rear end part in the second direction among the wall surface parts, the first order being different from the second order, and

the plurality of wall parts are formed integrally to connect the plurality of wall surface parts through the plurality of wall parts.

2. The developer container of claim 1, wherein
the plurality of wall surface parts are arranged adjacent to each other when viewed in the first direction.
3. The developer container of claim 1, wherein
some of the plurality of wall parts are arranged in the first direction to form a first wall group, and
the other of the plurality of wall parts are arranged in the second direction to form a second wall group.
4. The developer container of claim 1, wherein
of a plurality of corner areas where the plurality of wall parts intersect with the outer wall of the main body, a corner area where a wall surface part of the plurality of wall surface parts intersects with the outer wall has a curved shape larger than the other corner areas.
5. The developer container of claim 1, wherein
a space is formed inside the protrusion, and
the space communicates with the inner space of the main body.
6. The developer container of claim 5, wherein
the space is formed inside a wall part of the wall parts.
7. The developer container of claim 6, wherein
the wall part in which the space is formed is a wall part of the plurality of wall parts, which includes a wall surface part of the plurality of wall surface parts.
8. The developer container of claim 1, wherein
the protrusion has a recess defined by a part of the wall parts among the plurality of wall parts,
a space is formed inside a part of the part of the wall parts that defines the recess among the plurality of wall part, and
the space communicates with the inner space of the main body.
9. The developer container of claim 1, wherein
the protrusion has a recess defined by a part of the wall parts among the plurality of wall parts.
10. The developer container of claim 1, wherein
each of the wall surface parts includes a flat surface orthogonal to the first direction.
11. The developer container of claim 1, wherein
the protrusion is formed on a lower surface of the main body.
12. The developer container of claim 11, wherein
the protrusion is formed on part of the main body, which is closer to one of end parts of the main body than the other end part, and
the one of the end parts of the main body is inserted earlier than the other end part in fitting the developer container into the image forming apparatus.
13. The developing device of claim 1, wherein
with reference to the wall surface part located at the front end part in the first direction among the wall surface parts, at least one of the plurality of wall surface parts is located on one side of the protrusion in the second direction and at least another one of the plurality of wall surface parts is located on another side of the protrusion in the second direction.
14. A developing device, comprising:
a developer container configured to be filled with a developer;
a fitting part to which the developer container is fitted in a first direction; and
a developer housing to which the developer is supplemented,
wherein the developer container includes:
a main body having an outer wall and an inner space filled with a developer;
an opening which is opened in a rear of a central part of the outer wall of the main body in the first direction and from which the developer filled in the inner space falls; and
a protrusion located in front of the central part of the outer wall of the main body in the first direction and protruding outward from the outer wall of the main body,
the protrusion includes a plurality of wall parts,
each of the wall parts includes, at a front end of the wall part in the first direction, a wall surface part extending in the second direction,
the wall surface parts of the wall parts are ordered as a first order from a wall surface part located at a front end part in the first direction among the wall surface parts to a wall surface part located at a rear end part in the first direction among the wall surface parts, and ordered as a second order from a wall surface part located at a front end part in the second direction among the wall surface parts to a wall surface part located at a rear end part in the second direction among the wall surface parts, the first order being different from the second order, and
the plurality of wall parts are formed integrally to connect the plurality of wall surface parts through the plurality of wall parts,
the fitting part includes an opposing member to which the protrusion of the developer container is fitted when the developer container is fitted in the first direction,
the opposing member includes a plurality of opposing wall surface parts configured to face to the plurality of wall surface parts of the protrusion in the first direction, and
the plurality of opposing wall surface parts of the opposing member has an arrangement pattern, which is the same as an arrangement pattern of the plurality of wall surface parts of the protrusion.
15. An image forming apparatus, comprising:
the developing device of claim 14;
an image carrier configured to carry a developer image obtained by visualizing a latent image formed on a peripheral surface of the image carrier with developer supplied from the developing device; and
a transfer section configured to transfer the developer image from the image carrier to a sheet.

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